The Metals REVIEW

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THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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Continuous Process For Case Hardening Uses High Frequency

The first production line process of high speed continuous heat treating, using Megatherm high frequency energy, has been established by the Industrial Electronics Division of Federal Telephone and Radio Corp., Newark, N. J., the manufacturing associate of the International Telephone and Telegraph Corp. The application was to finished bearing pins, each 2½ in. long by ½ in. diameter, case hardened to a depth of 0.025 in. as they were fed automatically through a glass tube and water quenched as they left the heating coil at the rate of 75 bearing pins per minute.

The surface hardness developed was Rockwell C-60. The metal was chromium-molybdenum steel NE 9442. Employing 5-megacycle energy, the unit heated the surface of each part above its critical temperature in less than 1 sec. The high speed with which the heat was applied to the surface prevented penetration into the core and the central portion of the parts retained all the original toughness and strength.

The pins were finish ground prior to heat treating, and after the hardening process there was no scale or warpage. By the elimination of much costly finishing, usually required on hardened steel parts, tremendous savings are effected.

Complete safety to the operator characterizes this new process because of the protective features incorporated in the Megatherm unit. It has simple push button control, and requires no tuning or other technical adjustment. The cost of operation depends upon the size of the unit, but in the case of the 25-kw. Megatherm, it is approximately 50c per hr. The units are compact, requiring 4 x 4 ft. floor space, and adapted to in-line production.

Mention R331 When Writing or Using Reader Service

See Pages 13-19 for More New Products

NE Steels List Revised, Classification of Uses Given

The complete list of National Emergency steels containing the revisions and modifications made on May 26 by the American Iron and Steel Institute is contained in a data sheet published in the July issue of *Metal Progress*. This list gives compositions of all of the old steels as well as the new, with dates of adoption and the dates on which some of the earlier ones were abandoned. Hardenability figures are included for all of those in current use.

The July issue of *Metal Progress* likewise contains a comprehensive list of applications of NE steels. Uses are classified by the steel number and also cross-indexed alphabetically, giving all of the type numbers used for any particular machine part.

With the revision of the list of steels and addition of new compositions, work has also been started on a new edition of the NE Steels Pamphlet published by the American Society for Metals. Data will be incorporated in this publication covering properties and applications of the new steels as soon as results of tests and experience can be gathered; it is contemplated that this material will be available in about two months, when a completely revised and enlarged edition of the NE Steels Pamphlet will be published.

150 Periodicals Surveyed, Further Suggestions Invited

Over 150 current American and foreign periodicals are surveyed each month in the Metal Literature Review, a new feature of THE METALS REVIEW inaugurated last February. This annotated survey covers engineering, scientific and industrial journals and books published here and abroad, as well as preprinted papers presented before the important technical meetings in the metals field. The work is performed in the library of Battelle Memorial Institute, Columbus, Ohio.

The list of periodicals annotated will be found on page 2. If there are any notable omissions of important journals, readers are invited to call them to the attention of the headquarters staff and an endeavor will be made to add them to the list. British publications are indicated by the letter (B), other foreign publications by (F).

Hardness Measurement Determines Carbon Content of Cast Steels

The principle developed in 1938 by Burns, Moore and Archer that the hardness of a fully quench-hardened steel is primarily a function of its carbon content has been applied to a practical method for the rapid determination of carbon content in cast steels. The method, developed at the U. S. Naval Research Laboratory, is described in the June issue of *American Foundryman* by K. L. Clark and Nicholas Kowall.

Since hardness is independent of grain size or alloy content within the limits normally found in steels for ordinary purposes, carbon content can be judged on a properly prepared surface after quenching. Carbon content is then read from a curve previously established. The curve used by the present authors was based on data obtained from more than 60 induction steel heats differing widely in chemical composition and including carbon, medium manganese, manganese-molybdenum, copper, and various unclassified low alloy steels.

The method has been found to provide a satisfactory shop determination of carbon within the range of 0.15 to 0.50%, provided certain simple precautions noted in the article are followed in the testing procedure.

What's NEW in the REVIEW

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Additional Floor Space Provided to House Largest Metal Show

With 60,000 additional sq. ft. of floor space recently made available in Cleveland's Public Auditorium, there is now ample space to accommodate what promises to be the largest metal exposition ever held in America, as well as the largest in the 26-year history of this annual event. The total space now allotted to the National Metal Exposition, to be held the week of Oct. 16 through 20, is well over 168,000 sq. ft.

Floor plans were originally mailed out to previous exhibitors on March 1, in which the same amount of space was provided as was used for the Exposition in 1942, when it was also held in the Cleveland Public Auditorium. However, within a week it was evident that the demand for space would be well in excess of the total square footage allotted, and when the deadline for receipt of reservations arrived, the available space had been over-subscribed by 50,000 sq. ft.

The management of the Exposition immediately set in motion plans for securing additional space in that portion of the Auditorium which was under contract to the Cleveland Ordnance District. Eventually, through the cooperation of the Cleveland Ordnance District, Cleveland's Mayor Frank Lausche, the Cleveland Convention and Tourist Bureau, and other interested parties, negotiations were concluded to release about half of the space which the Ordnance District had under contract with the City of Cleveland, providing the needed additional 60,000 sq. ft. of space.

Revised floor plans were immediately sent out to old exhibitors and space assignments were made on June 27 and 28. Over 300 firms have already made reservations, but approximately 20,000 sq. ft. of desirable locations still remain. Hotel reservation form and the list of exhibitors as of July 1 will be found on page 9.

TTT Curves Explain Metallurgy Of Welding Self-Hardening Steels

Reported by G. W. Whitney
Chief Metallurgist, Emsco Derrick & Equipment Co.

A talk about the "Metallurgy of Welding Self-Hardening Steels," presented by Ed Brooker of the U. S. Spring and Bumper Co., before the April meeting of the Los Angeles Chapter A.S.M., was founded on the time-temperature-transformation curves. Mr. Brooker explained the usage of these curves in the processes of hardening steel and of welding.

Temperature gradients, the relation between the cooling rates of the welds and of the areas adjacent to the welds, and the hardness obtained were explained with the help of the TTT curves. By considering the hardenability of the steels being welded and the results of cooling as shown on the curves, the extent and degree of pre-heating and post heating required can be readily predicted, Mr. Brooker said.

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.

Name	Item No.	Check

File or Clip for Future Reference

This is a record of important new developments in the metal industry during the past month—save it!

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. PRODUCTION OF METALS

1-67. Manganese. D. D. Howat. *Mine & Quarry Engineering*, v. 9, May '44, pp. 107-113, 118.

Developments in the recovery from low-grade ores. 10 ref.

1-68. Gold and Silver Winning by Amalgamation. Douglas Rennie Hudson. *Metallurgia*, v. 29, April '44, pp. 299-303.

Some previous explanations of the amalgamation process of gold winning are shown to be ill-found theoretically. Quantitative determination shows that a mercury layer about 2.2 x 10^{-4} cm. in thickness is enough to impart the typical greasiness and high reflecting power to gold.

1-69. Recent Developments in Steelmaking. J. Edmiston. *Metallurgia*, v. 29, April '44, pp. 304-306.

Considerable attention has been given to the whole field of alloy steel consumption, and to schedule the various compositions and properties which apply to different uses, steelmakers have concentrated on maximum production of improved quality steel. Reviews some aspects of production and directs particular attention to the increased application of electric furnaces and to improvements in the production of clean steel.

1-70. Beneficiation of Arkansas Bauxite. S. M. Runke and R. G. O'Meara. *Mining Technology*, v. 8, May '44, T.P. 1698.

Processes for the production of alumina from low-grade bauxite, aluminite, and clay. Application of ore-dressing methods to improve the grade of high silica bauxite. Data obtained and detailed results of tests.

1-71. Canadian Magnesium. G. L. White. *Canadian Metals & Metallurgical Industries*, v. 7, May '44, pp. 20-23.

Development of the Pidgeon ferrosilicon process for the production of magnesium and its use by Dominion Magnesium, Ltd.

1-72. Fontana Steel Mill. *The Architectural Forum*, May '44, pp. 61-68.

Architecture, design and construction of new Kaiser plant.

1-73. An Investigation of Copper Losses in Copper Reverberatory Slags. A. M. Aksoy. Thesis for D.Sc. degree, Massachusetts Institute of Technology, 1943.

1-74. Equilibria in the Reduction of Chromic Oxide by Carbon, and Their Relation to the Decarburization of Chromium and Ferrochrome. F. S. Boericke. Bureau of Mines Report of Investigations 3747, June 1944.

Methods employed and results obtained in determining necessary, and previously unavailable, reliable fundamental data concerning the carbides of chromium. Application of the fundamental data to the decarburization of chromium and ferrochrome.

1-75. Rimming Steel—Experiments on Melts of Rimming-Steel Composition in the Laboratory High Frequency Furnace. T. Swinden, W. W. Stevenson, and G. E. Speight. Iron & Steel Institute, Advance Copy, April '44, 10 pp.

Using a small high-frequency melting unit (nominal capacity, 18 lb. of metal), experiments were conducted in an endeavor to reproduce the conditions prevailing during the freezing of commercial rimming-steel ingots. Owing to the small mass of material involved this was not completely possible, but some interesting observations were made. A noticeable feature was the invariable appearance of a thick crust of pure "rim" at the top of the ingots.

1-76. Some Notes on Slags and Slag Control in Basic Open-Hearth Tilting Furnaces Using Phosphoric Iron. A. Jackson. Iron & Steel Institute, Advance Copy, April '44, 18 pp.

Chronological development of a slag control method, designed first for use during refining, but subsequently enlarged to embody also the charging of lime in furnaces using high percentages of molten phosphoric iron. Conclusions point to some increased production resulting from the application of the methods outlined, but in particular indicate slag control to be one more step towards attaining uniformity of operation and product in the basic open-hearth.

1-77. Water Into Fire: The Story of Magnesium. A. Buirski. *Refractories Journal*, v. 20, April '44, pp. 166, 169-170.

Production and uses of magnesium.

1-78. Calcium and Magnesium. Glen D. Bagley. *Chemical & Engineering News*, v. 22, June 10, '44, pp. 921-924, 958, 960.

Development of the Electro Metallurgical Co.'s processes for their production.

1-79. The Melting of Brass and Bronze. *Industrial Heating*, v. 11, June '44, pp. 914, 916, 918, 920.

Crucible furnace melting, cupola melting of non-ferrous metals, arc-type electric furnaces, low frequency induction furnaces, high frequency induction furnaces, open-flame melting.

1-80. The Manufacture and Properties of Killed Bessemer Steel. E. C. Wright. *Metals Technology*, v. 11, June '44, T.P. 1692, 17 pp.

Results of investigations are based on at least five years of testing on thousands of heats of steel. Yield strength and fatigue properties of killed bessemer steel are superior to those of open-hearth steel of the same tensile strength; ductility and toughness, cleanliness and carburizing qualities are about equal to open-hearth of similar grades and ease of welding is better than for open-hearth of same tensile strength. 5 ref.

1-81. Operation of the Fontana Plant of the Kaiser Company, Inc., Iron and Steel Division. T. M. Price. *Blast Furnace & Steel Plant*, v. 32, June '44, pp. 675-682, 688.

Raw materials, coke plant, blast furnace, open hearth, mills.

1-82. The Relation of Open Hearth Practice to Segregation in Rimmed Steel. J. W. Halley and G. L. Plimpton. *Blast Furnace & Steel Plant*, v. 32, June '44, pp. 683-688.

Effect of mold size and shape on the rate of solidification; capping practice; examples of segregation in rimmed ingots. 11 ref.

LIST OF PUBLICATIONS

Aero Digest (B)
Aeronautical Engineering Review
Aircraft Engineering
Aircraft Production (B)
Alloy Metals Review (B)
Aluminum and the Non-Ferrous Review (B)
American Electroplaters' Society Monthly Review
American Foundryman
American Foundrymen's Association Transactions
American Iron & Steel Institute Yearbook
American Machinist
American Railway Engineers Association Bulletin
American Society for Metals Transactions
American Society of Testing Materials Proceedings
American Society of Mechanical Engineers Journal
American Society of Mechanical Engineers Transactions
Architectural Forum
Architectural Record
Archiv fur Eisenhuttenwesen (F)
Army Ordnance
Australasian Institute of Mining and Metallurgy Proceedings
Automotive & Aviation Industries
Aviation

Bell Laboratories Record
Bell System Technical Journal
Blast Furnace & Steel Plant
British Cast Iron Research Association Bulletin (B)
British Non-Ferrous Metals Research Association Bulletin (B)
Business Week

Canadian Chemistry and Process Industries
Canadian Metals & Metallurgical Industries
Canadian Mining & Metallurgical Bulletin
Ceramic Industry
Chemical Age (B)
Chemical & Engineering News
Chemical & Metallurgical Engineering News
Chemical Industries
Compressed Air Magazine

Die Casting
Diesel Progress

Electric Light & Power
Electrical Manufacturing
Electronic Engineering
Electronic Industries
Electronics
Electrochemical Society Transactions
Engineer (B)
Engineering
Engineering & Mining Journal
Engineering Inspection
Engineers' Digest

Factory Management and Maintenance
Finish
Fortune
Foundry
Foundry Trade Journal (B)

General Electric Review
Giesserei (F)

Hardware Age

Industrial Chemist
Industrial & Engineering Chemistry
Industrial Finishing
Industrial Gas
Industrial Heating
Industrial Radiography
Industry & Power
Industry & Welding
Institute of Metals Journal (B)
Institute of Welding Transactions (B)
Institution of Automobile Engineers (B)
Institution of Mechanical Engineers (B)
Instruments
Iron Age
Iron & Steel (B)
Iron & Steel Engineer
Iron and Steel Institute Journal (B)

Jernkontorets Annaler
Journal of Aeronautical Sciences
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Research National Bureau of Standards
Journal of Scientific Instruments

Korrosion Und Metallschutz (F)

Light Metal Age
Light Metals
Lubrication
Luftfahrtforschung (F)

Machine Design
Machine Tool Blue Book
Machine Tools
Machinery
Machinery (B)
Machinery Lloyd (B)
Mechanical Engineering
Metal Finishing
Metal Industry (B)
Metal Progress
Metal Treatment (B)
Metallurgia (B)
Metals
Metals & Alloys
Metals Technology
Mill and Factory
Mill Supplies
Mine and Quarry Engineering
Mines Magazine
Mining & Metallurgy
Mining Congress Journal
Mining Journal
Mining Technology
Mining World
Modern Industrial Press
Modern Industry
Modern Machine Shop
Modern Plastics

New Pencil Points
Newsweek

Optical Society of America Journal
Oxy-Acetylene Tips

Paint Technology
Pig Iron Rough Notes
Printing Equipment
Product Engineering
Products Finishing
Purchasing

Railway Age
Railway Mechanical Engineer
Refractories Journal

Scientific American
Schweizer, Archiv (F)
Sheet Metal Industries (B)
Society of Automotive Engineers Journal
Society of Chemical Industry (Journal and Transactions) (B)
Stahl und Eisen (F)
Steel
Steel Processing

The Miner
Time
Tin (B)
Tin & Its Uses (B)
Tool & Die Journal
Tool Engineer

Welding (B)
Welding Engineer
Welding Journal
West Scotland Iron & Steel Institute Journal (B)
Western Machinery & Steel World
Western Metals
Westinghouse Engineer
Wire & Wire Products

Zeitschrift fur Metallkunde (F)

2. PROPERTIES OF METALS

2-25. The Action of Water on Lead. E. A. G. Liddiard and P. E. Bankes. *Journal Society of Chemical Industry*, v. 63, Feb. '44, pp. 39-48.

A critical survey of published information is followed by an account of a study of the action of lead on distilled water containing known quantities of carbon dioxide.

2-26. Magnesium and Its Alloys. *Canadian Metals & Metallurgical Industries*, v. 7, May '44, pp. 38, 47.

Production methods, fabrication, deformation characteristics.

2-27. War's Effect on Wrought Copper Alloys and Their Production. D. K. Crampton. *Mining & Metallurgy*, v. 25, June '44, pp. 297-300.

Variety decreased—limits of compositions made more realistic—fabrication methods improved.

2-28. The Substance of and Mechanism in the Volatilization of Tin During Pyro-Metallurgical Processes. S. M. Baxter. Thesis for D.Sc. Degree, Massachusetts Institute of Technology, 1943.

2-29. The Application of Radioactive Tracers in the Study of Adsorption and Self-Diffusion in Certain Minerals. K. C. Vincent. Thesis for D.Sc. Degree, Massachusetts Institute of Technology, 1943.

3. PROPERTIES OF ALLOYS

3-89. The Strength Properties of Aluminum-Copper-Magnesium Deep-Draw Alloys. *Light Metal Age*, v. 2, May '44, pp. 19-22, 30, 32, 34, 36.

Concluding part of a recent German wartime investigation into an aluminum alloy containing 2% copper and varying percentages of magnesium and silicon after exposure to age hardening and tempering. Tests were conducted at the research laboratory of one of the largest light metal plants in Germany—Duerener Metal Works in Berlin.

3-90. Steel Mixes and Inoculants in Grey Cast Iron. W. Barnes and C. W. Hicks. Institute of British Foundrymen, Advance Copy, Paper No. 796, 41st Annual Meeting, June 10, '44, 15 pp.

Purpose of the investigation was to measure the effect on physical properties of increasing percentages of steel with and without a measured amount of various inoculants, to measure the effect of a fixed percentage of steel and varying amounts of inoculants and to ascertain the effect of increasing percentages of steel on the reaction of the resultant iron to low temperature treatment and to oil quenching.

3-91. Compositions of Emergency Steels are Modified. *Steel*, v. 114, May 29, '44, p. 61.

Changes designed primarily to permit greater consumption of nickel-chromium-molybdenum scrap. New series added.

3-92. Factors in the Development and Selection of High Temperature Alloys for Dynamic Loading. C. T. Evans. *Iron Age*, v. 153, June 1, '44, pp. 38-41.

The jet airplane and the newer gas turbines are built on the metals of the turbosupercharger. What these metals are and how they are being developed, and the problems involved in heavily loaded alloys in service for long periods of time at very high temperature.

3-93. Bronze Marches On. *Tin & Its Uses*, No. 15, March '44, pp. 6-8.

Technique for the manufacture of 88/10/2 alloy which develops the full physical qualities specified while reducing the tin content from 10% to 7½%.

3-94. Tin and Antimony in Lead Alloys. W. R. Lewis. *Tin & Its Uses*, No. 15, March '44, pp. 13-14.

Percentage composition and versatility of alloys.

3-95. Carbon and Alloy Steels for War Purposes. *Metallurgia*, v. 29, April '44, pp. 310-312.

A review of recent schedules and specifications.

3-96. Non-Ferrous Alloys for War Purposes. *Metallurgia*, v. 29, April '44, pp. 326-328.

Review of recent schedules and specifications.

3-97. Development of Armor Plate. *Metal Treatment*, v. 11, Spring '44, pp. 55-58.

Early history. Nickel steel armor, Harvey armor, Krupp armor, ballistic types, class B armor, armor bolts, light armor.

3-98. The Influence of Diameter upon the Properties of Steel Cable. W. Püngel, E. Gerold and A. Beidermühle. (*Zeit. Ver. Deut. Ing.*, v. 87, Aug. 7, 1943, pp. 493-497.) *Engineers' Digest*, v. 1, May '44, pp. 356-358.

The influence of cable diameter upon ultimate tensile strength for different diameters of the cable sheave; tests with the same cables were also conducted.

3-99. Wear-Resistant Castings Cut Maintenance Cost. Robert McIntosh. *Engineering & Mining Journal*, v. 145, May '44, pp. 76-78.

To increase the abrasion resistance and the resultant life of parts of equipment that are subject to wear, nickel-chromium white iron was used in castings. Analysis of the material used is within that established for Ni-Hard.

3-100. Failure of Spherical Hydrogen Storage Tank. A. L. Brown and J. B. Smith. *Mechanical Engineering*, v. 66, June '44, pp. 392-397.

Character of rapid progressive failure was due chiefly to the brittleness, under the conditions existing at the time, of the steel plates from which the sphere was constructed.

3-101. Cause and Control of Surface Damage. E. L. Hemingway. *Machine Tool Blue Book*, v. 40, June, '44, pp. 245-246, 248, 250, 252, 254, 256.

Modern view is that molecular attraction is responsible for the greater part of metallic friction.

3-102. Preferred Orientation, Anisotropy and Earing Behavior of Rolled Brass. F. H. Wilson. Thesis, Yale University, June 1944.

Integrated X-ray diffraction tests, special tensile and compressive property tests and drawn cup contours of brass sheet are correlated.

3-103. Hot Hardness Characteristics of High Speed Steels. R. A. Desilets. Thesis for M.Sc. Degree, Massachusetts Institute of Technology, 1943.

3-104. Titanium Bronze. G. P. Swift. Thesis for D.Sc. Degree, Massachusetts Institute of Technology, 1944.

3-105. The Effect of Boron in Steel. Robert Barnhart Corbett. Thesis for Ph.D. Degree, University of Pittsburgh, June 1944.

A. S. M. METAL LITERATURE REVIEW

3-106. Development and Application of Military and Special Steels for Ordnance Purposes. John H. Frye. *Blast Furnace & Steel Plant*, v. 32, June '44, pp. 695-697.

Ordnance items curtailed, metallurgical developments and improvements.

3-107. Liquidus Determinations in Zinc-Rich Alloys (Zn-Fe; Zn-Cu; Zn-Mn). Gerald Edmunds. *Metals Technology*, v. 11, June '44, T. P. 1686, 14 pp.

Technique for the accurate determination of liquidus points in zinc alloys has been described. This involves bringing a partly molten, partly solid alloy to equilibrium and removing and analyzing a sample of the melt. By use of a special sealed container, alloys that are volatile or reactive with the atmosphere have been included for investigation. 8 ref.

3-108. Influence of Hydrogen on Mechanical Properties of Some Low Carbon Manganese-Iron Alloys and on Hadfield Manganese Steel. Herbert H. Uhlig. *Metals Technology*, v. 11, June '44, T.P. 1701, 19 pp.

Preparation of alloys and test specimens, effect of furnace atmosphere on ductility of 14% manganese alloy, effect of hydrogen on reduction of area and other properties, effect of tempering, tensile strengths of low carbon alloys, discussion of results. The 6% manganese composition, the 21.5% manganese composition, effect of time and temperature on recovery of ductility, effect of dissolved hydrogen on Hadfield manganese steels, effect of cathodic hydrogen, theory for the cathodic hydrogen results. 14 ref.

3-109. Physical Properties of a 65 Cu, 10 Mn, 25 Zn Alloy. J. R. Long and T. R. Graham. *Metals Technology*, v. 11, June '44, T.P. 1705, 16 pp.

The alloy reported here along with several other ferrous and non-ferrous alloys, as possible cartridge-case material, was chosen after a review of the properties of the ternary alloys of copper-manganese zinc. 6 ref.

3-110. The Present Status of Electrolytic Manganese and Its Alloys. R. S. Dean. *Metals Technology*, v. 11, June '44, T.P. 1721, 17 pp.

Practice at Boulder City, quality of product, production of electrolytic manganese, ore reserves available for manufacture of electrolytic manganese, present uses of electrolytic manganese, behavior of copper-manganese alloys at low temperatures, direction of possible future development of ferrous alloys. 8 ref.

3-111. Gray Iron — Steel Plus Graphite. J. T. MacKenzie. *Metals Technology*, v. 11, June '44, T.P. 1741, 25 pp.

Henry Marion Howe Memorial Lecture. Gray iron is high Si steel with flakes of graphite. Formation of graphite, effect of graphite on mechanical properties of gray cast iron, useful functions of graphite. Models of graphite whorls show them as petals.

3-112. Endurance of Iron Alloys. *Chemical Age*, v. 50, May 6, '44, pp. 439-440.

Improvements by addition of metals.

3-113. The Examination of a Rimming-Steel Ingot Containing 0.29% of Carbon. T. Swinden. Iron & Steel Advance Copy, April '44, 6 pp.

A 2½-ton ingot of rimming steel containing 0.29% of carbon was examined with particular reference to carbon distribution. There were significant differences in the behavior of this steel as compared with low-carbon rimming steel during solidification, but nevertheless the heterogeneity was of the same general character. The rim contained about 0.25% of carbon, and, in answer to previous suggestions on the point, it is submitted that this could not have been deposited as primary crystals of delta-iron.

3-114. Metallurgy of the Gray Iron Matrix. R. J. Hafsten. *Iron Age*, v. 153, June 22, 144, pp. 48-51.

If gray iron is looked upon as being a graphitic steel, its metallurgy becomes less of a mystery and becomes readily understandable to the average technical man. 13 ref.

4. STRUCTURE

4-12. Polishing Aluminum Alloys for Metallographic Examination. H. K. Hardy. *Metal Treatment*, v. 11, Spring '44, pp. 37-44.

Not the least difficult part of metallographic examination is the satisfactory preparation of the specimen, particularly when dealing with the softer metals. Work which has been carried out in this direction and particulars of a method evolved giving satisfactory results with most aluminum alloys. 25 ref.

4-13. Sub-Critical Decomposition of Austenite in Chromium Steels. Eugene Paul Klier. Thesis, University of Notre Dame, 1944.

4-14. The Transformation of Retained Austenite in High Carbon High Chromium Steel at Sub-Atmospheric Temperatures. R. D. Potter. Thesis for M.Sc. Degree, Massachusetts Institute of Technology, 1943.

4-15. Microstructure of a Series of Restrained Welds. Robert McClure Stuchell. Thesis for M.S. Degree, University of Pittsburgh, June 1944.

4-16. A Study of the Spheroidization of Pearlitic Malleable Iron. Jun Hino. Thesis for M.S. in Metallurgical Engineering, University of Illinois, 1943.

4-17. The Apparent Microstructure Produced by Hydrofluoric Acid Etching Reagents on Pure Iron and Iron-Silicon Alloys. W. J. Wrazej. Iron and Steel Institute Advance Copy, April '44, 10 pp.

The investigation of the etching of iron-silicon alloys as well as pure (electrolytic) iron and also plain carbon steel and cast iron shows that, in all cases, when hydrofluoric acid is used as the etching reagent, the surface of the micro-samples is covered with scars (etch markings). Such scars, called "barley-shell" markings, appear when iron fluoride formed during the etching has the opportunity to crystallize (e.g., in the presence of alcohol or of alcoholic picric acid solution).

4-18. Orientations in Diffusion Layers. Shueling Woo, Charles S. Barrett and Robert F. Mehl. *Metals Technology*, v. 11, June '44, T.P. 1694, 10 pp.

New data on the orientation relationships occurring between phase layers formed by diffusion, in the Cu-Zn system, furnishes further evidence in support of the princile. 21 ref.

Materials Index

To the Metal Literature Survey

THE FOLLOWING tabulation classifies the articles annotated in the Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

1-69-72-75-76-80-82; **3**-100-105-112-113; **4**-17-20; **9**-12; **10**-32; **12**-150; **14**-234; **18**-125; **21**-79; **23**-171; **26**-67.

Cast Iron

3-90-99; **4**-16; **6**-26; **7**-46; **10**-30; **14**-207-215-219-220; **22**-262.

Cast Steel

12-135; **14**-208-219-229-230; **18**-112-114-115-122; **23**-168.

Wrought Carbon Steel

3-95-98; **12**-138-147; **18**-126; **19**-164-171; **20**-219-220-221-224; **22**-252-262; **23**-168.

Alloy Steel

1-69; **3**-91-95-97-108; **4**-13-14; **12**-122-123-124-129-135; **18**-127; **20**-208-219-220; **22**-272-273; **23**-175; **25**-150; **26**-63.

Stainless and Heat Resisting Steel

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Nickel, Monel and Nickel Alloys

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Tin and Tin Alloys

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3-107; **4**-18; **7**-59-61-63-64-65; **8**-45-49; **23**-174; **26**-64-65.

Miscellaneous and Minor Metals

1-67-68-78; **3**-110; **7**-55.

4-19. Precipitation and Reversion of Graphite in Low Carbon, Low Alloy Steel in the Temperature Range 900° to 1300° F. G. V. Smith, R. F. Miller and C. O. Tarr. *Metals Technology*, v. 11, June '44, T.P. 1695, 6 pp.

Graphitization of low carbon, low alloy steel, experimental procedure, discussion of results, 12 ref.

4-20. The Bainite Reaction in Hypoeutectoid Steels. E. P. Klier and Taylor Lyman. *Metals Technology*, v. 11, June '44, T.P. 1696, 26 pp.

The constitution of bainite is not well understood and divergent views have been expressed as to its mode of formation. A combination of dilatometric, microscopic and X-ray methods has been brought to bear upon the problem in the hope of some elucidation of the bainite reaction as it occurs in hypo-eutectoid steels. 22 ref.

4-21. A Numerical Rating Method for the Routine Metallographic Examination of Commercial Magnesium Alloys. P. F. George. American Society for Testing Materials Preprint 33, June '44, 7 pp.

With the rapid increase in the metallographic work on magnesium alloys and the difficulty of obtaining trained metallographers, it became necessary to develop a method for routine examination of these alloys, whereby inexperienced persons could record a microstructure. Such a method is described here and includes the specimen preparation, etching technique, and a rating system for recording the microstructure as a series of numbers.

4-22. An X-Ray Study of the Copper-Manganese Binary Alloy System. L. D. Ellsworth and F. C. Blake. *Journal of Applied Physics*, v. 15, June '44, pp. 507-512.

The x-ray study reported was made to determine whether superstructures are present in the copper-manganese binary alloy system. 4 ref.

5. POWDER METALLURGY

5-18. Powder Metallurgy. W. D. Jones. *Aircraft Production*, v. 6, May '44, pp. 226-229.

A survey of the possibilities of this technique. Dimensional changes, limitations of process, porous bearings, non-porous applications, contact materials, diamond-impregnated tools, physical properties, use as raw material.

5-19. Large Cemented Carbide Parts. *Steel*, v. 114, May 29, '44, p. 9.

Weights up to 100 lb. or more now may be produced by new hot press method. "Hot press" method which incorporates in one single operation three distinct processes of pressing, semi-sintering, and sintering.

5-20. Hot Pressing and Sintering of Carbide Powders. *Iron Age*, v. 153, June 8, '44, p. 71.

Ability to produce cemented carbide parts too large to be sintered in available furnaces—as well as special, thin-walled parts that tend to go out of round when sintered in the regular way after pressing—has been made possible by the development of a "hot press" method which incorporates in one operation the three processes of pressing, semi-sintering and sintering.

5-21. Parts from Metal Powders. Carl Claus. *Aeronautical Engineering Review*, v. 3, May '44, pp. 47, 49, 145.

Accomplishments; production of porous structures; accurate dimensions without machining, oil absorption for lubrication; limitations of powder metallurgy. Present production; future trends.

5-22. Some Aspects of Powder Metallurgy. J. C. Chaston. *Metal Treatment*, v. 11, Spring '44, pp. 15-18, 36.

Sintering of single-phase metals, the mechanism of sintering, sintering when a liquid phase is present; aluminum and aluminum alloys. 5 ref.

5-23. Surface Distribution in Comminution of Certain Minerals. S. S. Yavasca. Thesis for M.Sc. Degree, Massachusetts Institute of Technology, 1944.

5-24. Experimental Study of the Principles of Comminution. R. T. Hukki. Thesis for D.Sc. Degree, Massachusetts Institute of Technology, 1944.

5-25. Fracture and Comminution of Brittle Solids. Eugene F. Poncelet. *Mining Technology*, v. 8, May, '44, T.P. 1684.

Comminution of brittle solids occurs in: Deformation of the solid to be comminuted by the application of outside forces resulting in tensile stress, development of one or more cracks as a direct result of these stresses, formation of compression and transverse pulses caused by these breaks to travel through the solid, formation of residual particles of smaller and smaller sizes. 23 ref.

5-26. Particle Size Determination for Metal Powders. *Iron Age*, v. 153, June 15, '44, pp. 86-87, 166.

The use of a photocell to determine particle size makes available a simple method of calculating sizes of fine powders. This new apparatus can be employed for setting up standards and controlling production. Factors influencing the bonding of metal powders.

6. CORROSION

6-20. Corrosion-Resistant Materials in Pickling, Cleaning and Plating Operations. Edward Engel. *Products Finishing*, v. 8, June '44, pp. 68-72, 74, 76, 78, 80.

Complex factors of corrosion, complex forms of corrosion, corrosion resistant metals and structural materials, corrosion resistant flexible linings, corrosion resistant rigid and brick linings, acid and chemical resistant cements, plating rack insulation, protective paints, corrosion vapor control at the source, physical requirements of corrosion resistant materials.

6-21. Corrosion Resistance of Sandblasted 18-8 Stainless Steel. F. A. Truden. *Metal Finishing*, v. 42, June '44, pp. 335-337.

Tests may not prove anything conclusively, but they give an indication of what may be expected when stainless steel is sandblasted. Loss in weight by corrosion is considerably greater in the half-hard specimens in every instance. The loss in weight might be expected to be greater on the sandblasted specimens, whether annealed or half-hard. Tests definitely show that sandblasting does promote corrosion, or accelerates it, even though passivation follows sandblasting. 6 ref.

6-22. An Alternate Immersion Test for Aluminum-Copper Alloys. R. B. Mears, C. J. Walton, and G. G. Eldredge. American Society for Testing Materials Preprint, No. 29, June '44, 15 pp.

A control test for some aluminum-copper alloys is described. This test consists of alternately immersing specimens of these alloys in a solution containing 57 g. of sodium chloride and 3 g. of hydrogen peroxide per liter at 30° C. A detailed description of the best procedure is given. The effect of several variables, such as concentration and volume of the solution, or change in thickness and heat treating conditions of the test specimens, on the test results is discussed. 6 ref.

6-23. The Salt Spray Test. V. M. Darsey. American Society for Testing Materials Bulletin, No. 128, May '44, pp. 31-34.

Salt spray test, operating conditions, relations between humidity and salt fog concentration.

6-24. Refinery Corrosion Problems Reviewed. Ivy M. Parker. *National Petroleum News*, v. 36, June 7, '44, pp. R-376, R-378.

Causes of corrosion from oil and water in refineries and natural gasoline plants are reviewed and principal points of attack described. Experiences are given in combating corrosive tendencies of three types of water in the plant cooling water system.

6-25. Use of Nickel Alloys to Resist Corrosion. B. B. Morton. *National Petroleum News*, v. 36, June 7, '44, pp. R-381, R-382.

Refinery corrosion is sharply controlled by temperature as to character and intensity. In general the character of attack changes with the presence or absence of liquid water. To protect against sulphur attack at high temperatures, in excess of 500° F., there must be increasing quantities of chromium in the alloy.

(Continued on Page 6)

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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Compliments

To Lt. Col. PAUL C. CUNNICK, chairman of the Tri-City Chapter A.S.M., in charge of the metallurgical laboratories at Rock Island Arsenal, on his promotion from the rank of Major.

-*-

To FRANKLIN HOMER PAGE, JR., in charge of the process control department, Solar Aircraft Co., San Diego, Calif., on his citation by the company for the development of a new chemical process resulting in pickling improvements.

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To FRED M. ARNOLD, HARRY F. EHRICH and JOHN A. KINGSTON of the Norris Stamping and Mfg. Co., Los Angeles, and to HARLAN A. MESSNER of the Ohio Crankshaft Co., Cleveland, on citations from the Chief of Ordnance for outstanding personal achievements in producing steel cartridge cases.

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To W. E. REMMERS, past chairman, Chicago Chapter A.S.M., on his election as vice-president of Electro Metallurgical Sales Corp., New York.

-*-

To HARRY D. CHURCHILL, past chairman, Cleveland Chapter A.S.M., on his promotion from associate professor of mechanics, Case School of Applied Science, to the rank of full professor.

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To A.S.M. Members J. T. MACKENZIE, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala., and SAM TOUR, president, Sam Tour and Co., Inc., New York, on their election to the Executive Committee of the American Society for Testing Materials.

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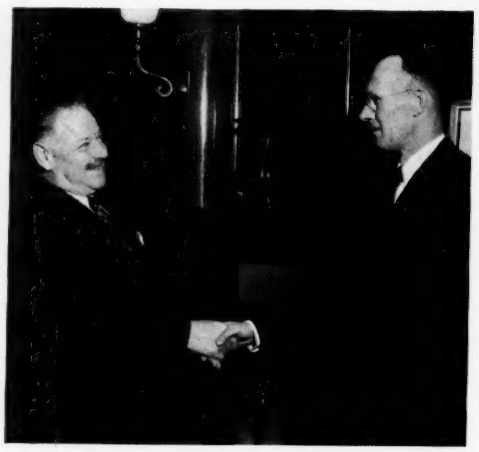
For honors by the American Foundrymen's Association: To RUFUS F. HARRINGTON, foundry superintendent, Hunt-Spiller Mfg. Co., Boston, on the award of the John A. Penton Gold Medal for outstanding pioneering work in foundry sand control; to CARL F. JOSEPH, research metallurgist, Saginaw Malleable Iron Division, General Motors Corp., the William H. McFadden Gold Medal for outstanding metallurgical and shop practice contributions to the foundry industry, especially the malleable iron section; to STANLEY W. BRINSON, honorary life membership in the Association.

Houghton Announces New Edition Of Practical Metallurgy for Engineers

A completely revised edition of "Practical Metallurgy for Engineers" by the metallurgical staff of E. F. Houghton & Co. has recently been announced. This book includes both elementary information on the process of heat treatment for the beginner, and also the latest information on new phases of metallurgy, including hardenability, grain size, Jominy tests, and NE steels. Because of this combination of basic practical data and reference materials of value to the trained metallurgist, it fills a real need.

"Practical Metallurgy for Engineers" should not be confused with "Practical Metallurgy" by Sachs and Van Horn, published by the American Society for Metals, which it antedates by many years in its earlier editions. The book is obtainable only from the Houghton Press, 303 West Lehigh Ave., Philadelphia, Pa.; it contains 480 pages and the price is $3.00 per copy.

Named Vice-President of General Alloys Co.



A.S.M. National Secretary Eisenman Extends Hearty Good Wishes to J. Edward Donnellan on his termination of 20 years' service with the American Society for Metals to become vice-president of General Alloys Co.

Donnellan Ends 20 Years With A.S.M., Leaves Metals Handbook as Monument

Terminating 20 years of service with the American Society for Metals, J. EDWARD DONNELLAN on July first became vice-president in charge of sales for General Alloys Co., Boston.

As editor of A.S.M. Metals Handbook and secretary of all of its technical committees, Ed Donnellan has accomplished a monumental task in building this publication from a thin loose-leaf notebook into an authoritative bound volume of 2000 pages familiarly known as the Bible of the metal industry. No successor has yet been appointed to undertake this work and Mr. Donnellan will continue to supervise the Handbook from his Boston office.

Another of his duties at the A.S.M. headquarters for many years has been to assist in the management and supervision of the annual National Metal Expositions, and arrangements have been made with General Alloys Co. to loan his services back to the Society to install and supervise the Exposition to be held in Cleveland next October.

Ed was graduated from Pratt Institute in 1918 as an industrial chemical engineer, and was assigned by the Government to the Atlas Powder Co. to make smokeless powder for World War I. Preferring metals, his next move was to the New Departure Mfg. Co. as metallurgical chemist. Next he served as metallurgical assistant to Dr. McAdam at the United States Naval Experiment Station at Annapolis. He left the Navy to serve as assistant metallurgist with Halcomb Steel Co., and then became chief chemist and metallurgist with a steel foundry company.

In November 1923 the directors of the American Society for Steel Treating (later changed to American Society for Metals) decided to secure a secretary for the Society's national technical committees. Ed Donnellan's unusual experience won him the job which continued with many additional responsibilities through June 1944.

Two New Technical Societies to Participate In Metal Congress

Two new technical societies are planning to participate in this year's National Metal Congress, to be held in Cleveland the week of Oct. 16. They are the Society for Experimental Stress Analysis and the American Industrial Radium and X-Ray Society. Other cooperating societies in the National Metal Congress are the American Society for Metals, sponsor of the event, the Iron and Steel and Institute of Metals Divisions of the American Institute of Mining and Metallurgical Engineers, and the American Welding Society.

Watch for complete programs of the cooperating societies in the August and September issues of THE METALS REVIEW. See hotel reservation form on page 9.

All of these organizations are planning technical and special programs beginning on Monday, Oct. 16 and continuing through Friday afternoon, Oct. 20. The aims and functions of these societies dovetail so well into a single purpose that the Congress this year will present one of the best and most well-rounded programs in its history.

Stress Analysts Have Four-Day Meeting

The Society for Experimental Stress Analysis holds two national meetings each year, the last one having been held in Boston during the spring. National headquarters for the Society are at Massachusetts Institute of Technology, Cambridge, Mass., with Prof. W. M. Murray of M.I.T. as president. Members of the Executive Committee are M. Hetenyi, Westinghouse Electric & Mfg. Co.; C. Lipson, Chrysler Corp.; and R. D. Mindlin, Columbia University.

During the National Metal Congress the Society will have headquarters at the Carter Hotel, Cleveland. Technical sessions will be held both morning and afternoon on Tuesday, Wednesday, Thursday and Friday, Oct. 17 through 20, with the annual dinner meeting on Thursday evening.

Radium and X-Ray Group Organized

The other group meeting with the Metal Congress for the first time is the American Industrial Radium and X-Ray Society, a newly organized and rapidly growing group. Technical sessions are planned for mornings and afternoons on Thursday and Friday, Oct. 19 and 20, with a special meeting of the Cleveland Section on Monday, Oct. 16, and the annual meeting of the Society on Thursday afternoon. Convention headquarters will be at Hotel Hollenden.

The technical program is under the direction of Roy W. Emerson, metallurgist, Pittsburgh Piping and Equipment Co., Pittsburgh, Pa. M. B. Evans, Ternstedt Mfg. Division of General Motors Corp., Detroit, is president; Philip D. Johnson is secretary with offices at the national headquarters of the Society, 25 E. Washington St., Chicago 2, Ill., and J. A. Catanzano is treasurer.

The American Society for Metals will have joint headquarters during the Metal Congress at the Statler and Hollenden Hotels; the American Institute of Mining and Metallurgical Engineers will be at the Statler, and the American Welding Society will have headquarters at Hotel Cleveland.

Unionmelt Provides Rapid Deposition, Deep Penetration

Reported by A. H. Lewis
Metallurgist, Dominion Engineering Co., Ltd.

The Unionmelt process is essentially a method of electric welding in which the end of the electrode is constantly submerged in a layer of granulated, semi-refractory material, R. J. Anderson, Unionmelt engineer at Dominion Oxygen Co., Ltd., Toronto, told the Montreal Chapter of the A.S.M. at the meeting on May 1. A part of this material melts, and the melted portion, which is expended or used, acts as a conductive and resistant medium for transmitting current from welding rod to the work piece and it aids the unmelted portion mechanically to exclude the air. The unmelted, unused portion can be picked up and used later.

The electrode, which is uncoated, may be in the form of continuous wire for light gage metal, or rods for heavier gages. The electrode is fed through a machine which carries it along the seam and automatically feeds it into the weld. The granulated Unionmelt is carried in a hopper and fed continuously ahead of the electrode. The process is only suitable, therefore, for downhand welding.

Unionmelt welding was originally developed for use on pressure vessels, boiler work and shipbuilding. It is characterized by very high current densities in the welding rod ranging up to 40,000 amp. per sq. in. This results in very rapid deposition rates and deep penetration.

The method is fully automatic so that the responsibility for its operation falls chiefly on the management and engineering personnel rather than on the operator, as in other welding processes. The chief problem of management is arranging for a smooth flow of materials.

Plate-edge preparation was discussed at some length. Unionmelt welding requires a much smaller angle of bevel than ordinary arc welding because of the great penetration. Wherever there is a possibility of the molten puddle falling through, backing must be provided. This may be a steel or copper plate or a trough of granulated Unionmelt.

Slides showed plate-edge preparation using special oxy-acetylene cutting machines, which can trim and bevel in one operation with great accuracy. Speeds are very high, running about 70 in. per min. on ¼-in. plate and 40 in. per min. on ¾-in. plate. Applications illustrated ranged from joining 10½-in. plate to such special applications as a small high temperature, high speed, alloy steel, hot gas turbine rotor.

100 Charter Members in New Kansas City Chapter

Front Row, Seated, Left to Right, Are C. C. Chilson of the Executive Committee; G. S. Young, Secretary-Treasurer of the Chapter; National Secretary W. H. Eisenman; A. W. F. Green; F. A. McCoy, Chapter Chairman; Kent R. Van Horn, A.S.M. National Vice-President; and L. D. Morrell, Chapter Vice-Chairman. Standing, left to right, are L. A. Rehard, E. G. Warner, R. E. Moser, B. C. Kayes, C. K. Kenyon, H. C. Deterding, R. W. Long, and R. H. Cowan.

More than 100 representatives from the aviation, steel, aluminum, die casting, aeronautical parts, oil and chemical fields signed up to become charter members of the new Kansas City Chapter of the American Society for Metals at the charter meeting on May 26.

F. A. McCoy of Sheffield Steel Corp. was elected chairman of the new chapter, L. D. Morrell of E. F. Houghton & Co., was elected vice-chairman, and G. S. Young of Kansas City Power and Light Co., secretary-treasurer.

About 200 persons attended the organizational meeting. W. H. Eisenman, national secretary, gave formal notification of the granting of the charter by the Board of Trustees and spoke briefly on the functions and services of the Society.

Kent R. Van Horn, A.S.M. national vice-president and research metallurgist, Aluminum Co. of America, then presented the technical talk on "Applications of Aluminum Cast and Wrought Alloys." Two Navy films "Unfinished Business" and "Navy in the Air" were shown.

Arthur W. F. Green, chief metallurgist of Pratt & Whitney, who was largely instrumental in the formation of the chapter, had been working with other members on organization plans for several months prior to the granting of the charter.

New Processes Make Demands on Steels For High Temperature

Reported by H. H. Uhlig
Research Laboratory, General Electric Co.

A wealth of data on a timely subject—"Steels for High Temperature Service"—was presented by C. L. Clark of Timken Roller Bearing Co. before the Schenectady Chapter A.S.M. at its April meeting.

The speaker showed that all alloy additions can be classified, (*a*) according to their tendency to form carbides or to enter into solid solution in ferrite, (*b*) on the basis of promoting ferrite or austenite. In the development or application of high temperature steels the function of each element must be recognized.

Classification of high temperature steels is based on the chromium content, with the low alloyed steels containing up to 4%, the intermediate alloyed steels from 4 to 10% and the stainless steels over 10.5% chromium.

Data were presented to show the influence of variations in the chromium, molybdenum, silicon and titanium content on the creep and rupture strength, oxidation and corrosion resistance and hardness after both welding and air cooling. Slight variations in certain elements such as nitrogen may have a pronounced influence on the service life of some of the austenitic steels.

The metallurgical problems involved in some new processes as a result of the war were described. Metals are now operating at temperatures higher than ever before, and certain new corrosive agents such as HF, $AlCl_3$-HCl and H_2SO_4 have introduced many new problems in the general field of high temperature steels.

The presence of an unrecognized phase in columbium-bearing 18-8, heat-treated at about 1300° F. for many hours, was an interesting point of discussion. This phase also appears in some higher chromium, higher nickel iron alloys without columbium.

Postwar Use of Light Metals Promoted in Northwest

Early in 1942, the department of mechanical engineering at the State College of Washington, Pullman, in cooperation with the Washington State Planning Council, began work on a program designed to encourage fabrication and use of the light metals in the Pacific Northwest.

This effort has been developed along two principal lines, it was explained by E. B. Parker, supervisor, light metals foundry, and associate professor of mechanical engineering, Washington State College, at the annual election meeting of Oregon Chapter, American Society for Metals. First line of development, Professor Parker said, was the establishment and operation of a combination experimental and production magnesium alloy foundry. Second was the promotion and encouragement of the fabrication and use of the light metals by the northwest industries.

The first mentioned activity has been successful from the beginning and several thousand magnesium alloy castings are being furnished the aircraft industries monthly. The second phase of the work has been in progress since the first of the year and early indications point to considerable success in directing attention to the possibilities in the light metal field.

The State College of Washington and the Washington State Planning Council have cooperated in carrying on this work as a state project. However, it is recognized that full success cannot be obtained unless the entire northwest is united in the common desire to make the most of the opportunities in this important industrial field.

Circulation of Salt Is Advantage Provided by Electrode Type Bath

Reported by P. F. Ulmer
Metallurgist, Link Belt Co.

"Electrode-Type Salt Bath Furnaces in Modern Heat Treating Practice" was the subject of an illustrated talk by H. J. Babcock, research engineer, Ajax Electric Co., before the final meeting of the season of the Indianapolis Chapter.

The speaker illustrated by diagram some of the factors which make the electrode-type salt bath both workable and desirable. Most pertinent is the circulation of salt by the magnetic field around the electrodes. Because of this the electrodes can be spaced at predetermined intervals along the side of a large pot. According to data given by the speaker, very little temperature variation is found even in the corners of the pots.

Salt is especially useful in cyclic annealing of steel and the newer heat treating methods known as martempering and austempering because of the rapid rate at which heat is extracted from the metal. This rapid heat transfer is useful in dip brazing of several types, especially the brazing of aluminum.

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Ryerson furnishes a detailed data sheet showing Jominy Hardenability curves for the specific heat of steel supplied on every alloy shipment.

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Employment Bureau

Address answers care of American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a statement of availability, if employed in an essential activity.

Positions Open

METALLOGRAPHER: Recent B.S. graduate in metallurgy with one or two years' experience in applied metallography of non-ferrous metals. Top priority war research project in New York City. Salary open. Box 7-5.

SALES ENGINEER REPRESENTATIVES: Exceptional proposition for representatives experienced in combustion engineering to represent Burdett "Infra-Red Principle" burner equipment. Equipment is a natural for both war and peacetime production. For complete information write Burdett Mfg. Co., 39 N. Loomis St., Chicago 7, Ill.

FORGE SHOP SUPERINTENDENT: Experienced flat die forging superintendent for large shop. 1500-lb. to large size hammers. Excellent position for capable man. Must be leader. Permanent. All information in first letter. Box 7-10.

PHYSICAL METALLURGIST: With sound fundamental training and research ability for development work associated with iron founding. Permanent position with an eastern independent commercial research and development organization, with initial opportunity to proceed to advanced college degree. State availability, education, experience, and salary expected. Box 7-30.

SPECTROGRAPHER: Experienced in spectrographic analyses of ferrous and non-ferrous metals using a Littrow-type spectrograph. Must also be able to use a densitometer and should have at least two years of college chemistry and be draft exempt. Location St. Louis, Mo. Box 7-45.

HEAT TREAT FOREMAN: Old-line machine tool corporation in north-central Indiana would like experienced man to take charge of heat treat department; modern type furnaces, 35 men in department. Applicant must have good knowledge of ferrous metallurgy. State age, experience, education, draft status, references and salary requirements. Box 7-50.

CHEMIST: With metallurgical experience in non-ferrous foundry work for Wisconsin manufacturer. Newly equipped laboratory; excellent post-war future. Services needed by Sept. 1. Box 7-55.

Positions Wanted

METALLURGIST: Ferrous. Formerly chief metallurgist in two different plants; draft exempt. Located in Cleveland but willing to move. Six years' experience in forgings, gears, and general heat treatment. Available at once. Box 7-15.

SPECIFICATION ENGINEER: Former metallurgist's assistant. Desires executive position in material recommendations and standards control. Ten years' background in application of ferrous and non-ferrous material in aircraft and automotive engineering. Preferred location—Michigan; Oakland, Wayne, or Macomb Counties. Box 7-20.

METALLURGIST: B.S. degree. Six years' laboratory and heat treating experience; two years as plant metallurgist. Familiar with material specifications, metal cleaning and plating, oils, induction hardening and machining problems. Capable of handling experimental work and supervisory responsibilities. Desires position with small manufacturer. Box 7-25.

ENGINEER-METALLURGIST: Several years' practical experience in building construction, design and drafting; six years in steel and brass plants, metallurgical and research laboratories. Graduate of large eastern college, age 34. Desires permanent connection with consulting engineer, design, or product designing engineer. Box 7-35.

METALLURGIST: Four years' experience teaching metallurgy and foundry practice. Chicago or midwest area preferred. Box 7-40.

A.S.M. Review of Current Metal Literature — *Continued*

6. CORROSION (*Cont.*)

6-26. **Stress Corrosion of Cast Irons.** R. F. Hehemann, D. A. Shepard and L. Thomassen. *Metals & Alloys*, v. 19, May '44, pp. 1141-1144.

Data on resistance of cast irons to stress corrosion that might assist the equipment designer or materials engineer in appraising their suitabilities. Malleable iron castings possess unexpectedly good resistance to stress corrosion. 8 ref.

6-27. **Stress Corrosion Cracking of Mild and Stainless Steels.** These for Ph.D. Degree in Metallurgy, Illinois Institute of Technology, 1944.

Evolves a general theory in which stress corrosion susceptibility is correlated with the ease of transformation from a metastable state, such as in age hardening. In the cracking of boiler plate steels, heat treatment and stress level were found to be interrelated, and remedial treatments also were studied. The mutual effects of the carbon, nitrogen, and aluminum contents were investigated. Effectiveness of a number of corroding solutions was evaluated and a number of the consequences of theory were verified with magnesium-base alloys.

6-28. **A Study of the Problems of Corrosion and Erosion of Distillers' Food and Feed Recovery Equipment.** Roland Arthur Kozlik. Thesis for Degree of M.S. in Metallurgical Engineering, University of Kentucky, June 1944.

6-29. **Man Against Oxygen.** R. G. Sloane. *Scientific American*, v. 171, July '44, pp. 22-24.

In the perpetual struggle to prevent oxygen from combining with man's best metals, such as iron, the petroleum corrosion preventives, now proved up in the war, are shouldering their way into wider use.

6-30. **The Corrosion of Aluminium Welds in Nitric Acid.** W. L. Hall and E. G. West. *Institute of Welding Transactions*, v. 7, March '44, pp. 30-37.

Samples cut from gas (oxy-acetylene) and metallic arc welds in super-purity and commercial-purity aluminum were exposed to the action of 70% and 37% nitric acid at room temperature and 37% acid at 60 to 70° C. The specimens were tested not only in the as-welded conditions, but also after cold hammering and after annealing with and without previous cold hammering. Welds made in super-purity aluminum using super-purity filler rods or 99.85% aluminum electrodes were attacked only slightly more severely than the parent metal. Welds in commercial-purity aluminum using filler rods or electrodes of the same composition were attacked preferentially to the basis plate.

6-31. **Mechanism of Electrolytic Oxidation of Aluminum.** Scott Anderson. *Journal of Applied Physics*, v. 15, June '44, pp. 477-480.

Proposes to show that the compact barrier layer separating the base of the pores from the aluminum is continuous, unbroken, and is the seat of the growth processes which result in the formation of the oxide coating. 4 ref.

6-32. **On the Destructive Action of Cavitation.** M. Kornfeld and L. Suvorov. *Journal of Applied Physics*, v. 15, June '44, pp. 495-506.

Historical survey, conception of the mechanism of the destructive action of cavities, the setting of the problem, experimental device and preliminary experiments, optical part of the experimental arrangement, radical and surface vibration of air bubbles, loss of stability of shape of vibrating air bubbles, cavities. 21 ref.

6-33. **Causes and Prevention of Boiler Priming & Solids Carryover.** W. H. Rowand. *Blast Furnace & Steel Plant*, v. 32, June '44, pp. 710, 712, 733-736.

Factors which cause the entrainment of boiler water, and its attendant salts, in the saturated stream leaving a boiler drum and what has been done to correct these conditions.

7. PROTECTION

7-53. **Non-Rusting Tinplate.** R. Kerr. *Tin & Its Uses*, No. 15, March '44, p. 16.

A new rust-preventing process that will be of great value to the tinplate industries.

7-54. **Uses of Clad Steels to Combat Corrosion.** Martin J. Conway. *National Petroleum News*, v. 36, June 7, '44, pp. R-378, R-381.

Type of clad steels in which nickel, copper and their alloys are bonded to steel base plate. Clad steels can be fabricated in the plant shop with reasonable care and supervision. Procedure for welding these types of steels is described.

7-55. **Measurement of Thickness of Fired-On Gold Coatings.** K. H. Ballard. *Metal Finishing*, v. 42, June '44, pp. 342-343.

A jet-test method for measuring the thickness of liquid bright and burnish gold coatings on ceramics and two independent standardization methods for determining the stripping factors of the ammonium iodide-iodine-hydrochloric acid-Gardinol reagents. The method would be applicable to thickness measurements of ceramic coatings of gold alloys, but a stripping factor for each particular alloy would have to be ascertained. The method is rapid and with reasonable care should be accurate to ± 6%. 5 ref.

7-56. **Metal Finishing at Nash-Kelvinator.** Bryant W. Pocock. *Products Finishing*, v. 8, June '44, pp. 42-44, 46, 48, 50, 52, 54, 58.

Putting final touches on parts for the well-known Hamilton Standard propeller is a far cry from this company's peacetime pursuit of manufacturing automobiles and electric refrigerators. 2 ref.

7-57. **Maintenance Repairs Facilitated by Metal Spray Process.** Francis A. Westbrook. *Industry & Power*, v. 46, June '44, pp. 65, 93.

Eastern States Cooperative Milling Corp. utilizes metallizing process chiefly for building up shafting—saves time, labor, and materials.

7-58. **Hard-Surfacing Applications and Techniques.** *Society of Automotive Engineers Journal*, v. 52, June '44, pp. 25-32.

Equipment required, magnaflux test, oxy-acetylene process, electric process, selection of hard-surfacing rod, operator training, costs of hard-surfacing, automotive parts regularly hard-faced, machine parts in maintenance shops, tractor drive sprockets, tractor track rails, tractor idler wheels, tractor track rollers, tractor grousers, bulldozer tips, dipper fronts, shovel-driving tumblers, shovel teeth, shovel crawler pads, carry-all blades, sheepsfoot tampers, grader blades.

7-59. **Galvanizing Industry Will Be Challenged by Substitutes in the Post-War Period.** Nelson E. Cook. *Metals*, v. 14, May '44, pp. 8-11.

Wonderful merits being claimed for new products but these will have to be proved. Zinc coated products will meet challenge.

7-60. **Choosing the Right Material—VII.** H. W. Gillett. *Machine Design*, v. 16, June '44, pp. 123-128.

Use of clad metals is expanding; possibilities for high temperature service; thick lead coatings offer protection; machinability is important factor; manganese is promising alloy; stainless has noteworthy fatigue properties; substitute for copper band; process can spoil best material; unnecessary requirements restrict alternatives. 8 ref.

7-61. **Copper in Galvanizing Zincs and Galvanizing Baths.** Wallace G. Imhoff. *Wire & Wire Products*, v. 19, June '44, pp. 353-357, 390.

Copper content of galvanizing bath is harmful or beneficial, depending on amount present.

7-62. **Rod and Wire Coatings in the Cleaning House.** Floyd M. Hauger. *Wire & Wire Products*, v. 19, June '44, pp. 358-361, 390.

Discusses properties required in compounding a lubricant, film strength, solubility, melting point and particle size.

7-63. **Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces.** Wallace G. Imhoff. *Industrial Gas*, v. 22, June '44, pp. 17-18, 39-42, 44.

Discussion of fuels from viewpoint of heating hot-dip galvanizing furnaces: Oil fuel.

7-64. **"Keep 'Em Sailing!"** Charles Bolton. *Welding Engineer*, v. 29, June '44, pp. 50-51.

"Tasco" saves dollars and days by using the metallizing process to build up worn parts, correct errors made in machining and restore galvanized coating. In one year, over 72 miles of zinc wire were atomized and sprayed.

7-65. **Repairing Damaged Areas in Galvanized Coatings.** F. D. McBride. *Steel*, v. 114, June 12, '44, pp. 106, 109, 152, 154.

Making effective repairs without resorting to redipping the entire piece. For a suitable repair material, it is necessary to find one which remains positive electrochemically with respect to iron and steel but at the same time has a melting point lower than that of pure Zn. The composition must also retain its protective ability for a long period and it must be inexpensive.

7-66. **Production Metallizing.** H. E. Linsley. *Steel*, v. 114, June 19, '44, pp. 92, 132, 134.

Completely automatic system applies coating of aluminum to steel aircraft cylinders at rate of one every 75 sec.

8. ELECTROPLATING

8-43. **The Chemistry of Electroplating.** C. B. F. Young. *Products Finishing*, v. 8, June '44, pp. 82-84, 86, 88, 90, 92, 94, 96.

Ionic reactions are illustrated in detail and compounds studied.

8-44. **The Use of Insulation and Fixtures in Precision Selective Plating.** C. T. Wells. *Metal Finishing*, v. 42, June '44, pp. 338-341.

Production selective plating is highly dependent on choosing the proper insulation and is oftentimes aided by proper design and use of a blocking fixture. Outlined in detail are plastic solutions, lacquers, wax, and molded plastic masks.

8-45. **The Use of Zinc Dust in the Purification of Zinc Plating Solutions.** Myron Diggin. *Metal Finishing*, v. 42, June '44, p. 344.

To produce acceptable zinc deposits, alkaline zinc plating solutions must be free from heavy metal impurities. Inspection of the parts plated with zinc is made difficult by the presence of impurities which cause dark, smutty or streaked deposits. Deposits containing heavy metal impurities do not have as high a protective value as pure electrolytic zinc. Subsequent finishes such as Cronak, Bonderizing, etc., are difficult to apply to deposits produced in a solution containing metallic impurities.

8-46. **Tinning Cast Iron.** R. A. Cresswell. *Tin & Its Uses*, No. 15, March '44, pp. 3-4.

A wide range of cast irons can be very successfully hot-tinned if they are suitably prepared, and the procedure now devised is less complicated than some of the processes hitherto in use.

8-47. **Modern Electro-Tinning.** *Tin & Its Uses*, No. 15, March '44, pp. 15-16.

Electro-tinned coatings are widely applied to fabricated articles and components to provide corrosion resistance and improved solderability.

8-48. **New Nickel-Iron Alloy for Electroplating.** A. H. Du Rose and P. R. Pine. *Steel*, v. 114, June 12, '44, p. 124.

Extensive research develops "bright" deposit of fine crystal structure, high in tensile strength yet ductile, with good corrosion resistance and simplicity in application. Labeled "new composition of matter" due to many unusual properties.

8-49. **Zinc Plating of Large Aircraft Structures.** Manuel Sanz. *Iron Age*, v. 153, June 15, '44, pp. 64-70.

The equipment and technique employed in zinc plating of large and complex aircraft structures. Also mentioned are the cleaning and passivating practices, as well as data on changing the tanks from cadmium to zinc plating.

8-50. **Engineered "Erosion."** G. W. Birdsall. *Steel*, v. 114, June 19, '44, pp. 82-83, 156, 158-160.

Gives to chromium-plated surfaces the porosity needed to lubricate them properly, thus greatly reducing wear and thereby extending life of engine cylinders and piston rings. Important war uses forecast greatly expanded postwar application of the process.

8-51. **The Halogen Tin Process.** *Western Metals*, v. 2, June '44, pp. 25-26, 29.

New Du Pont electrotinning method offers advantages.

9. ELECTROMETALLURGY

9-9. **Electrochemistry in the Post-War World.** R. M. Burns. Electrochemical Society, Preprint 85-23, 6 pp.

In the post-war world electrochemistry should create new products and new industries, and by process improvement and increased efficiency should reduce the cost of existing products and insure their wider distribution. Electrochemical industry will require abundant and reasonably priced electric power to operate processes, research to develop new things, trained engineers to direct technology, and an intelligent and sympathetic governmental attitude toward private enterprise.

9-10. **Electrical Energy Consumption in Electrolytic Processes.** H. Walde. (*Die Chemische Technik*, v. 16, Aug. 14, '43, pp. 153-7.) *Engineers' Digest*, v. 1, May '44, pp. 331-333.

Improvements of the electrolytic process center around the problems of designing a plant of maximum efficiency, and of operating it in such a way as to maintain highest possible efficiency in continuous plant operation.

9-11. **The Extraction of Tin from Tin Cans by Means of Electrometallurgical Methods.** S. H. Cankut. Thesis for M.Sc. Degree, Massachusetts Institute of Technology, 1943.

9-12. **Electrometallurgical Treatment of Ores.** Charles Hart. *Blast Furnace & Steel Plant*, v. 32, June '44, pp. 673-674, 691-694.

Facts, figures and furnaces pertaining to manufacturing of steel, pig iron, and ferro-alloys.

10. ANALYSIS

10-28. **Organic Reagents in Quantitative Metallurgical Micro-Analysis—Part I.** R. Belcher and C. E. Spooner. *Metallurgia*, v. 29, April '44, pp. 329-332.

The theory underlying the application of organic reagents to micro-metallurgical analysis is summarized. Particular attention is directed to compounds in which some of the principles of complex formation are indicated. A subsequent article will review some of the more recent practical methods by which these compounds have been utilized in the micro-determinations of metal.

10-29. **General Methods of Micro-Chemical Analysis of Metals.** I. H. Hadfield. *Metal Treatment*, v. 11, Spring '44, pp. 19-28.

Describes the early attempts at micro-chemical analysis. Modern qualitative and quantitative determinations, including gravimetric and volumetric processes. 19 ref.

10-30. **Recommended Methods for the Determination of Silicon in Acid-Resisting High-Silicon Irons.** *Journal Society of Chemical Industry*, v. 63, Feb. '44, pp. 63-64.

Precautions to be observed in the analysis of this material are set out and recommended methods for umpire and routine analysis are described.

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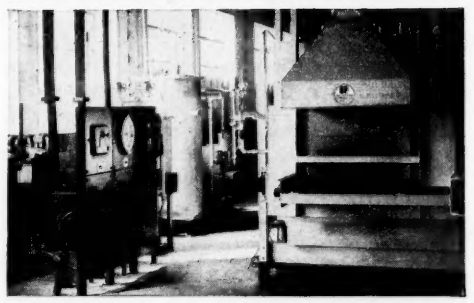

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Metal Literature Review—*Continued*

10. ANALYSIS (*Cont.*)

10-31. Surface Measurement by van der Waals Adsorption. A. M. Gaudin and F. W. Bowdish. *Mining Technology*, v. 8, May '44, T.P. 1666.
Determining the amount of nitrogen that is adsorbed by a given sample of solid at the temperature of boiling nitrogen. The more surface there is on the solid—both internal and external—the more nitrogen is abstracted. 10 ref.

10-32. Colorimetric Determination of Nickel in Steel. C. G. Hummon. *Steel*, v. 114, June 19, '44, p. 97.
Filters, solutions, procedure.

10-33. Colorimetric Methods for the Analysis of Magnesium-Base Alloys. V. A. Stenger. American Society for Testing Materials Preprint 38, June '44, 7 pp.
Analysis of magnesium alloys with the aid of a photoelectric colorimeter (filter photometer) or spectrophotometer.

10-34. Colorimetric Methods for the Analysis of Copper-Base Alloys. C. Zischkau. American Society for Testing Materials Preprint 39, June '44, 7 pp.
The methods presented in this paper have been assembled from various sources and represent procedures that have been found suitable by the submitters, for the colorimetric determination of certain elements in copper-base alloys.

11. LABORATORY APPARATUS, INSTRUMENTS

11-66. The Use of the Spectroscope in Steelworks. John Cameron. *West Scotland Iron & Steel Institute Journal*, v. 51, Part 2, 1943-44, pp. 15-27.
Use of the spectroscope in steel-works has already carved out for itself a large and useful field of application. Moreover, as improvements in technique occur, as they are bound to do, the spectroscope will occupy an even larger and more useful place in the equipment of modern and progressive steelworks. 11 ref.

11-67. Electronics as a Measurement Tool Accelerates Scientific Progress. H. Johnston. *Industry & Power*, v. 46, June '44, pp. 58-60.
Far surpassing the sensitivity of human sight, hearing, and touch, electronic measuring instruments help control the quality of products being manufactured, safeguard employes, and improve working conditions.

11-68. Electrical Strain Gauging. C. G. A. Woodford. *Aircraft Production*, v. 6, May '44, pp. 245-249.
Methods of winding, wire material, strain sensitivity, circuit arrangements, static testing.

11-69. Mercury-Arc Rectifier. W. C. White. *General Electric Review*, v. 47, June '44, pp. 9-13.
Beginnings of this form of electron tube featuring the pool cathode.

11-70. Electric Controls for Present and Post-War Products. *Product Engineering*, v. 15, June '44, 16 pages opposite 392.
An editorial summary of developments in electric controls for industrial, domestic and aircraft accessory applications, with reference to mechanical and electrical characteristics.

11-71. The Electron Tube—Genie, Gremlin or Jeep? W. D. Cockrell. *Mining Congress Journal*, v. 30, May '44, pp. 41-43, 54.
Description of the fundamental principles of one of industry's newest aids.

11-72. The Electron Microscope. W. Wilson. *Metal Treatment*, v. 11, Spring '44, pp. 3-13.
Principles, construction and applications. 2 ref.

11-73. Gaging Systems. C. D. Wright. *Tool Engineer*, v. 13, June '44, pp. 70-74.
Study of three systems for a uniform gaging standard points to the best features of each and a possible combination of values to attain maximum interchangeability.

11-74. Metallurgical Applications of the Eberbach Micro Hardness Tester. Howard Edward Bernhardt. Thesis, University of Wisconsin, June 1944.

11-75. Electronic Regulation of Industrial Processes. S. L. Burgwin. *Instruments*, v. 17, June '44, pp. 328-330, 369.
Essential features, an interesting phototube application, amplification, stability.

11-76. Electric Gaging Methods for Strain, Movement, Pressure and Vibration. Howard C. Roberts. *Instruments*, v. 17, June '44, pp. 334-339.
Pick-up devices: variable-inductance type; push-pull types, mutual-inductance types, reluctance types; definitions, formulae, and theory. 10 ref.

11-77. Electron Tubes—Their Principles and Their Instrumentation Applications. Andrew W. Kramer. *Instruments*, v. 17, June '44, pp. 340-344, 354, 356, 358, 360, 362, 364, 366.
Photovoltaic cells, their characteristics and how they work, the Dynatron principle and the electron multiplier, the mercury-arc rectifier.

11-78. Supersonics at Work. *Scientific American*, v. 171, July '44, pp. 10-12.
Inaudible wave power is being used today to detect flaws and deviations in manufactured products, to measure underwater depths and distances, and to detect underwater objects such as fish. Principles have been developed which have interesting possibilities for future expansion.

11-79. Electronics in Industry. Carl J. Madsen. *Western Metals*, v. 2, June '44, pp. 48-52.
Development of electronics; definitions and applications.

11-80. The Furth Microphotometer. R. W. Pringle. *Electronic Engineering*, v. 16, May '44, pp. 512-513.
An improved form of an instrument which is entirely based on electronic principles. 4 ref.

12. TESTING, INSPECTION AND RADIOGRAPHY

12-120. Purchase of Steels on Performance Rather Than Analysis—Dependable Performance is the Prime Consideration. Glen C. Riegel. *Metal Progress*, v. 45, June '44, pp. 1090-1092.
If so-called performance tests in advance of steel fabrication can be correlated to the enhancement of durability and dependability in service, it is proper to make such tests at the earliest possible stage in the conversion of steel to finished parts to avoid misuse or loss after fabrication has proceeded so far that scrap and remelting is the only recourse.

12-121. Present and Proposed System of Specifications. Ernest E. Thum. *Metal Progress*, v. 45, June '44, pp. 1093-1094.
Analysis is distinctly secondary to some physical test, surface condition, or dimensional tolerance. Performance tests complicated from purchasers' viewpoint, steel makers' standpoint, and engineers' standpoint. German specifications as an example.

12-122. Equivalence of Hardened Steels When Tested in Tension and Impact. Walter G. Patton. *Metal Progress*, v. 45, June '44, pp. 1094-1096.
When yield point of fully hardened steels is plotted against tensile strength the result is a straight line (or band) up to a strength of 200,000 psi. Composition has small if any influence on the yield point other than in its indirect effect through depth of hardening. From 100,000 to 200,000 psi. a range of ± 10% from a smooth average curve includes 90% of the ratios for reduction of area, and 80% of the ratios for elongation. Above 200,000 psi. results are very erratic.

12-123. Appraisal of Steels by Their Hardenability. Walter E. Jominy. *Metal Progress*, v. 45, June '44, pp. 1097-1099.
End-quench test gives very little hint as to machinability, although it does give a pretty good idea about the ease of annealing, for the higher the hardenability, the more slowly the steel must be cooled to produce the desired low hardness for machining or cold working.

12-124. Alloy Steel Specifications Based on Type Analysis and Hardenability. Greswold Van Dyke. *Metal Progress*, v. 45, June '44, pp. 1099-1100.
More logical method of specifying alloy steels would be first to select a certain type of steel, and then—instead of specifying the exact chemical composition—simply require that the steel have a certain specified degree of hardenability, which is also a measure of strength.

12-125. Problems Applying Especially to Toolsteels. Sam C. Spalding. *Metal Progress*, v. 45, June '44, pp. 1100-1101.
Price, chemical composition and physical characteristics used as indexes in purchasing steels for tools.

12-126. The Metallurgical Notch as a Factor in Fatigue Failure. Walter H. Bruckner. *Metal Progress*, v. 45, June '44, pp. 1102-1103.
Uses the term "metallurgical notch" to denote narrow regions within a piece of metal, or near welded joints, where considerable changes in hardness occur. These act as stress raisers and have been responsible for numerous fatigue failures.

12-127. Further Examples of the Damping Capacity of Metals. W. H. Hatfield, L. Rotherham, and E. M. A. Harvey. *Metallurgia*, v. 29, April '44, pp. 295-298.
The main objects of the work described concern the investigation of points raised in connection with a previous paper.

12-128. Radiography Applied to Welding. Leslie W. Ball. *Iron Age*, v. 153, May 25, '44, pp. 54-58.
Information on the quality of welds can be obtained only by proper choice of a number of technical factors which apply in radiography. Emphasizes the need for reciprocal understanding between the welding engineer and the radiographer of X-ray problems so that standards of acceptability can be set up.

12-129. Statistical Control in the Inspection of Materials. Margaret Phipp. *Aircraft Engineering*, v. 16, April '44, p. 119.
Inspection of special steels, and the method of recording.

12-130. Radiographic Inspection. L. Mullins. *Welding*, v. 12, April '44, pp. 179-185.
Non-destructive examination of welds. 22 ref.

12-131. Report of Committee A-6 on Magnetic Properties. American Society for Testing Materials, Preprint No. 10, June '44, 17 pp.
Report on round-robin core loss testing at high flux densities; proposed tentative definitions of terms, with symbols, relating to magnetic testing.

12-132. Micro-Deformation under Tension and Compression Loads of Thin Aluminum Alloy Sheets for Aircraft Construction. Georges Welter. American Society for Testing Materials Preprint No. 31, June '44, 17 pp.
Test results on the stress characteristics for micro-elastic and micro-plastic deformations as well as the modulus of elasticity of thin aluminum alloy sheets in tension and compression. The sheets were analyzed for seven different angles to the direction of rolling and cold stretching as well as over the whole width. Investigation, consisting in submitting the specimens to tension stresses, succeeded by compression, showed results which are of interest to the designer and constructor of modern monocoque structures. A new gripping device for tension tests and a special device for compression tests on single thin specimens have been developed. 5 ref.

12-133. Preliminary Studies on a Drop Ball Impact Machine. George Lubin and Roswell R. Winans. American Society for Testing Materials *Bulletin*, No. 128, May '44, pp. 13-18.
The drop ball impact test method is more applicable and more accurate than the Izod excess swing pendulum for impact strength determinations. Most of the errors inherent in the Izod machine are eliminated or reduced to a minimum using the drop ball method. The impact fatigue strength of plastics as determined by the latter method is a reliable indication of the actual working stress of the material. 5 ref.

(Continued on page 8)

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Metal Literature Review

12. TESTING AND INSPECTION (Cont.)

12-134. **Metallography in Color.** R. P. Loveland. American Society for Testing Materials *Bulletin*, No. 128, May '44, pp. 19-29.
Problems of color photography discussed from the standpoint of (1) separation negative method, (2) screen plate process and (3) integral tripack process. Applications to photomicrography. 17 ref.

12-135. **Hardness Measurement for Rapidly Determining Carbon Content in Cast Steels.** K. L. Clark and Nicholas Kowall. *American Foundryman*, v. 6, June '44, pp. 13-14.
A method of hardness measurement for the rapid determination of the carbon content of carbon and low alloy steels.

12-136. **Photo-Elasticity.** *Automobile Engineer*, v. 34, April '44, p. 146.
An optical method of experimental stress analysis.

12-137. **X-Raying of Magnesium Parts.** Robert Taylor. *Aero Digest*, v. 45, May 15, '44, pp. 116-117, 220.
Various researches have shown that the most suitable contrast for X-ray inspection is found in the region of densities extending from 2.0 to 2.5. To obtain a closer approximation, the present study was undertaken. This study indicated that, at a density of 2.45, a film contrast sufficient to reveal a sensitivity of 1% in the radiography of magnesium alloy castings can be obtained with the proper type of film.

12-138. **Sheet Fractures Detected with Supersonics.** *Iron Age*, v. 153, June 8, '44, pp. 60-61.
German supersonic equipment has been developed to non-destructively locate intercrystalline fractures parallel to the surface of steel sheets. A continuous water contact is maintained between the steel sheet and the oscillator. 4 ref.

12-139. **Improved Methods for Determining the Compression Properties of Sheet Metal.** K. R. Jackman. *Automotive Industries*, v. 90, June 1, '44, pp. 36-38, 82.
Survey indicated that there was no method of obtaining the compressive properties of thin sheet-metal coupons rapidly and accurately. Consolidated Vultee developed a simple test procedure and the necessary test equipment for quickly and accurately determining the compressive properties of thin sheet-metal coupons.

12-140. **Magnetic Particle Inspection.** C. E. Betz. *Canadian Metals & Metallurgical Industries*, v. 7, May '44, pp. 30-34, 44-45.
Magnaflux method of inspection and an appraisal of methods and applications.

12-141. **"Black" Light.** G. W. Birdsall. *Steel*, v. 114, June 12, '44, pp. 94-97, 156, 158-159.
New and highly sensitive inspection tool provides positive indication of defects that otherwise would show up only as service failures. By preventing these failures, reliability of such critical items as aircraft engine bearings is greatly improved.

12-142. **Testing of Metals and Alloys.** J. W. Donaldson. *Metal Treatment*, v. 11, Spring '44, pp. 45-51, 54.
Summary of American work on methods of testing. Efforts made to obtain a closer correlation between different tests. Methods of micro-testing are also referred to. 26 ref.

12-143. **Applications of Industrial Radiography.** *Metal Treatment*, v. 11, Spring '44, pp. 59-61.
Non-technical statement showing some of the applications for which the method is particularly suitable.

12-144. **Progress in Bearing Metal Research.** P. G. Forrester. *Tin & Its Uses*, No. 15, March '44, pp. 5, 8.
Examination of the fatigue strength of various alloys.

12-145. **Calibration of X-Ray Stress Measurement Technique.** B. A. Erzoz. Thesis for M.Sc. Degree, Massachusetts Institute of Technology, 1944.

12-146. **Quantitative Measurements of X-Ray Energy.** Robert Taylor. *Aero Digest*, v. 45, June 1, '44, pp. 110,112.
Direct measurements customary, ions proportional to radiation, ionization chamber described.

12-147. **Measurement of Dynamic Stress and Strain in Tensile Test Specimens.** R. O. Fehr, E. R. Parker, and D. J. DeMicheal. *Journal of Applied Mechanics*, v. 11, June '44, pp. A-65-A-71.
The tensile strength, the yield strength, and the breakage energy of test specimens (cold-rolled steel and dural) were measured while the specimens were being broken by a force applied at a high rate of speed in a commercial high-velocity impact-testing machine. The dynamic tensile strength, the dynamic yield strength and the dynamic breakage energy were found to be higher than the static values up to the maximum impact velocities of these tests. 7 ref.

12-148. **Measurement of the Damping of Engineering Materials During Flexural Vibration at Elevated Temperatures.** Carl Schabtach and R. O. Fehr. *Journal of Applied Mechanics*, v. 11, June '44, pp. A-86, A-92.
A tuning-fork specimen is set into vibration by jerking a spreader from the gap between the ends of the tines. The damping is expressed in terms of the logarithmic decrement of the decaying vibration, which is measured and recorded by means of a magnetic oscillograph, amplifiers, and a resistance-type electric strain gage cemented to the specimen. The results include (1) the damping of a number of materials during flexural vibration and (2) the variation in modulus of elasticity with temperature.

12-149. **The Technical Cohesive Strength of Some Steels and Light Alloys at Low Temperatures.** D. J. McAdam, R. W. Mebs, and G. W. Geil. American Society for Testing Materials, Preprint 27, June '44, 31 pp.
Tension tests of notched and unnotched specimens have been made at room temperature and at selected low temperatures down to that of liquid air. Diagrams have been constructed to show the influence of notch depth, notch angle, and root radius on strength and ductility. A study is thus made of the influence of the ratio of radial to axial stress on the technical cohesion limit and the influence of plastic deformation, heat treatment, and temperature on technical cohesive strength.

12-150. **X-Ray Unit Can Penetrate Steel Plate 8 in. Thick.** John L Bach. *Blast Furnace & Steel Plant*, v. 32, June '44, pp. 689-694.
The new and compact General Electric million-volt industrial X-ray unit is less than 5 ft. high and 3 ft. in diameter, and weighs about 1500 lb.

Bates Addresses Ladies' Night at Pueblo

Pueblo Group of Rocky Mountain Chapter met on April 20 to hear A. Allan Bates speak on "Engineering Materials of the Future". At the speakers' table in the background are, left to right, Harold Gumma, Mrs. W. B. Jacobson, wife of the chairman of the Group, Dr. Bates, and Mr. and Mrs. Vic Johnson. Mr. Johnson, vice-chairman, presided in the absence of Chairman Jacobson.

Reported by R. Wayne Parcel
Metallurgist, The Denver and Rio Grande Western R. R.

Of the various metallic elements used as materials of construction, iron will always predominate, although aluminum, magnesium, and just possibly titanium and manganese will be competing elements, Dr. A. Allan Bates, director of chemical and metallurgical research of the Westinghouse Electric & Mfg. Co., predicted at the April meeting of the Rocky Mountain Chapter A. S. M.

Speaking on "Engineering Materials of the Future", Dr. Bates dwelt briefly on the prophecies that plastics will extensively replace the engineering metals, stating that such a circumstance will probably never come to pass, since the true position of plastics is to extend the use of the older materials. He predicted that the plastics industry will be an important one, raising our standard of living by adding to the things we now have rather than taking their places.

Members of the local groups of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers were guests at the meeting held on April 21 in Denver. Dr. Bates also addressed the Pueblo Group of the Rocky Mountain Chapter on the preceding evening.

Outlines Advantages of Electric Steel

Reported by R. C. Heaslett
General Metallurgist, Continental Foundry & Machine Co.

A brief outline of the advantages of production of steel by the electric furnace opened a lecture on "Making Electric Furnace Aircraft Steels" by L. H. Nelson, mill metallurgist, Republic Steel Corp., Chicago plant. Mr. Nelson addressed the final technical meeting of the Pittsburgh Chapter A.S.M. on May 11. The advantages enumerated included:

1. A source of heat which adds no impurities to the furnace system.
2. A slag which can be made oxidizing, neutral, or deoxidizing as desired.
3. Desulphurization and deoxidation under the same slag.
4. Addition of high alloy contents with low loss.
5. A product uniform in chemical and physical properties from heat to heat.

By the aid of slides, Mr. Nelson described the construction of a typical 70-ton basic electric furnace and followed the course of a heat from charging to tapping. He discussed the use of both cold and liquid charges.

For the making of high quality aircraft steels, he emphasized the need of "melting in" high enough in carbon so that some carbon must be worked out with ore under an oxidizing slag before slagging off. Thus the heat has received all the refining possible by the open-hearth process before the deoxidizing slag is used.

He stated that the period after removal of the original slag and the addition of the new one is where the electric furnace shows its true value. Then the slag can be maintained neutral or deoxidizing as desired, can desulphurize and deoxidize the bath, and permits the addition of any alloys in the bath as desired. The bath temperature can also be regulated.

Commenting on pouring practice, Mr. Nelson said that it must be good, repeating the familiar axiom, "Steel can't be made on the pouring platform, but a lot can be ruined." He suggested that molds should be at a temperature of 150 to 250° F. and properly coated. Mold design should be correct and stripping and soaking practice must receive careful attention.

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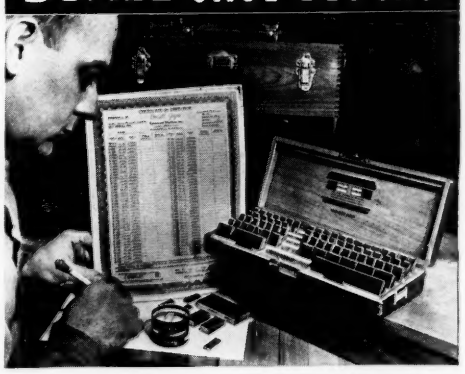

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LIST OF EXHIBITORS

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Acme Tool Co.
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Ajax Electric Co., Inc.
Ajax Electrothermic Corp.
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Alloy Casting Co.
Alloy Rods Co.
Alox Corp.
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Chase Brass and Copper Co.
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Cleveland Tapping Machine Co.
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Dillon and Co., Inc., W. C.
Diversey Corp.
Dravo Corp.
Drop Forging Association
Do-All Cleveland Co., Inc.
Dow Chemical Co.
Du Mont Laboratories, Inc., Allen B.
DuPont de Nemours & Co., E. I.

East Shore Machine Products Co.
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Eastman Kodak Co.
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Eclipse Fuel Engineering Co.
Elastic Stop Nut Corp. of America
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Elwell-Parker Electric Co.
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General Alloys Co.
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Hercules Electric and Mfg. Co.
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Industry and Welding
Instrument Specialties Co., Inc.
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Hold-Hold Mfg. Co.
Krouse Testing Machine Co.
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Lakeside Steel Improvement Co.
Lead Industries Association
Lepel High Frequency Laboratories
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L'Hommedieu and Sons Co., C. F.
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Los Angeles Chamber of Commerce
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Magnetic Analysis Corp.
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Metals Review
Metallizing Co. of America
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Meyers Co., W. F.
Michiana Products Corp.
Mid-Continent Metal Products Co.
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Milwaukee Metal Spinning Co.
Mine Safety Appliances Co.
Minnesota Mining and Mfg. Co.
Molybdenum Corp. of America
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National Bronze & Aluminum Foundry Co.
National Engineering Co.
National Industrial Publishing Co.
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Ohio Carbon Co.
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Ohio Steel Foundry Co.
Olson Filtration Engineers
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Precision Scientific Co.
Progressive Welder Co.
Promat Division of Poor and Co.
Pulmosan Safety Equipment Corp.
Pyrometer Instrument Co.

Radium Chemical Co.
Ransburg Co., Harper J.
Ransohoff, Inc., N.
Ransome Machinery Co.
Redmer Air Devices Corp.
Reeves Pulley Co.
Reinhold Publishing Co.
Resistance Welder Manufacturers Association
Revere Copper & Brass Co.
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Mid-Continent Takes Over National Machine

The Mid-Continent Metal Products Co. has announced that it is now the sole manufacturer of the industrial gas burning equipment and Lo-Blast power gas burners formerly manufactured by the National Machine Works of Chicago. These products will hereafter be marketed under the name of National Machine Gas Burners Division of Mid-Continent Metal Products Co., Chicago 3, Ill.

HOTEL RESERVATION FORM

National Metal Congress and War Conference Displays

October 16 through 20, 1944

Cleveland, Ohio

PLEASE use this form in making your hotel reservations for this year's National Metal Congress in Cleveland. Because of its successful operation in the past four years, a Housing Bureau has been set up again this year to handle these reservation forms. All reservations should be sent to the Housing Bureau.

While the Housing Bureau will not assign rooms until the period between Sept. 1 and 15, it will be helpful to have your reservation as soon as possible in view of the crowded hotel conditions. If you write a letter regarding your hotel rooms, be sure to attach this form, since each of the cooperating societies has an application form of a different color. All applications will have immediate post card acknowledgment from the Housing Bureau.

Kindly indicate your date of arrival (time of day if possible), date of departure, and **notify the committee if you change your plans.** Try to double up where possible to make complete use of the rooms that are available. Hotel and room rates are:

HOTELS	Single Rooms	Double Rooms Double Bed	Double Rooms Twin Bed
AUDITORIUM	$2.00 to $3.50	$4.00 to $6.00	$4.50 to $7.00
CARTER	3.00 to 6.00	4.50 to 7.00	5.50 to 9.00
CLEVELAND	3.00 to 7.00	4.50 to 9.00	6.00 to 12.00
HOLLENDEN	3.00 to 5.00	4.50 to 6.50	5.00 to 12.00
OLMSTED	2.00 to 3.50	3.50 to 6.00	6.00 to 7.00
STATLER	3.00 to 6.00	5.00 to 8.00	5.00 to 8.00

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American Society for Metals—Hotel Statler and Hotel Hollenden.
American Institute of Mining and Metallurgical Engineers—Hotel Statler.
American Welding Society—Hotel Cleveland.
American Industrial Radium and X-Ray Societv—Hotel Hollenden.
Society for Experimental Stress Analysis—Hotel Carter.

HOTEL RESERVATION APPLICATION

National Metal Congress and War Conference Displays

October 16 through 20, 1944

Cleveland, Ohio

Mrs. Edward C. Brennan, Chairman
Housing Bureau, National Metal Congress
Room 1604, Terminal Tower
Cleveland 13, Ohio

Date.....1944

Please make hotel reservations as noted below:

.....Single room(s) for one person.....Room rate desired $..... to $.....

.....Double room(s) with double bed.....Room rate desired $..... to $.....

.....Double room(s) with twin beds.....Room rate desired $..... to $.....

.....Parlor with ..... connecting bedrooms.....Room rate desired $..... to $.....

Arriving October.....A.M. or.....P.M. Leaving October.....

Hotel of First Choice.....

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If your first-choice hotel is unable to accept your reservation, the Housing Bureau will endeavor to comply with your second or third choices in the order named. This application will have immediate postcard acknowledgment and you will be notified of your room assignment shortly after September 10.

Applicant .....

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City .....State .....

(List of occupants other than myself, with their addresses, is attached)

A.S.M. Review of Current Metal Literature — *Continued*

12. TESTING & INSPECTION (*cont.*)

12-151. **Factors Affecting Hardness Relationships in the Range 50 to 250 Brinell.** Robert H. Heyer. American Society for Testing Materials, Preprint 95, June '44, 18 pp.

The effect of work-hardening capacity and the importance of close control of time of lead application. A method based on observation of the contour of hardness indentations is described for constructing general hardness conversion tables of improved accuracy. Certain hardness-tensile strength relationships given in the literature are considered from the standpoint of the author's experimental data. A testing procedure is suggested for establishing both hardness and tensile conversion tables for specific materials.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-18. **Thermocouple Method for the Measurement of Liquid Steel Casting-Stream Temperatures.** D. A. Oliver and T. Land. *Metallurgia*, v. 29, April '44, pp. 307-310.

A new method of measuring the true temperature of liquid steel in the casting stream.

13-19. **Bi-Metallic Pyrometer.** E. Stuart Clarke. *(Commonwealth Engineer*, v. 31, Jan. '44, p. 148.) *Engineers' Digest*, v. 1, May '44, p. 336.

Pyrometer requiring an oil temperature in the region of 225° C. correct to ± 5° C.

13-20. **Automatic Control Equipment IV.—Industrial Applications.** W. H. Steinkamp. *Industry & Power*, v. 46, June '44, pp. 69-71.

Controls for the following: Steam desuperheater, furnace pressure, galvanizing kettle, rotary hearth forge furnace, continuous billet heating furnace, distillation control, and fractionating tower temperature.

13-21. **Saving Man-Hours and Materials Through Gas and Fuel Control Instrumentation Methods.** Edward A. Dieterle. *Instruments*, v. 17, June '44, pp. 326-327, 370-371.

Methods and industrial applications.

13-22. **A Thermocouple Method for the Measurement of Liquid Steel Casting-Stream Temperatures.** D. A. Oliver and T. Land. *Foundry Trade Journal*, v. 73, May 4, '44, pp. 3-6.

A simple and successful method for measuring the temperature of the casting stream in the foundry.

14. FOUNDRY PRACTICE AND APPLIANCES

14-206. **Sandslinger Moulding Practice.** W. Y. Buchanan. Institute of British Foundrymen, Advance Copy, Paper No. 795, 41st Annual Meeting, June 10, '44, 8 pp.

Moulding operations require the ramming of a quantity of sand into a space of irregular shape with the object of producing a uniform degree of ramming on all surfaces of the pattern. Methods of obtaining the desired results in moulds and cores: (a) Hand ramming; (b) jolt ramming; (c) squeeze ramming; (d) blowing; and (e) sandslinger. The last method is under consideration here.

14-207. **The Development and Production of Inoculated Cast Iron.** H. P. Hughes and W. Spenceley. Institute of British Foundrymen, Advance Copy, Paper No. 797, 41st Annual Meeting, June 10, '44, 14 pp.

Investigation and experiments which led to regular production of inoculated cast iron developed to replace ordinary cast iron, and to attempt to overcome some of the present-day problems of the iron founder.

14-208. **Steel Castings in Aircraft.** J. F. B. Jackson. *Aircraft Production*, v. 6, May '44, pp. 207-209.

Application on intrinsic merits: Special foundry technique to develop required properties.

14-209. **American Diecasting Practice.** *Aircraft Production*, v. 6, May '44, pp. 253-255.

New types of equipment and the conversion of gooseneck machines.

14-210. **Producing Magnesium Castings.** *Canadian Metals & Metallurgical Industries*, v. 7, May '44, pp. 24-27.

Technique at the Robert Mitchell Co., Ltd. Melting, sand practice, cleaning, finishing and general and X-ray inspection.

14-211. **Metallurgy in the Non-Ferrous Foundry.** A. C. Boak. *Canadian Metals & Metallurgical Industries*, v. 7, May '44, pp. 27-30.

Correct melting practice for Cu-base alloys: Avoid reducing furnace atmospheres, reducing gas producing covers or fluxes, improperly dried ladles, melting metal coated with reducing gas producing substances such as grease, oil and moisture. Melt in a furnace atmosphere containing 0.3 to 1% free oxygen. Avoid excessive oxidation losses by proper furnace design, rapid melting, proper charging and production timing.

14-212. **Causes of Porosity in Gunmetal Castings.** W. B. George. *Foundry Trade Journal*, v. 72, April 13, '44, pp. 305-310.

Saving castings and improving production through reducing the number of rejects.

14-213. **Modern Foundry Practice.** C. R. Day. *Foundry Trade Journal*, v. 72, April 13, '44, pp. 311-314, 316, 318.

International foundry industry developments.

14-214. **Development of a Flux Degassing Process for Chill-Cast Tin Bronzes.** W. T. Pell-Walpole. *Institute of Metals Journal*, v. 11, April '44, pp. 127-147.

Experiments to develop a flux degassing process for tin bronzes. The method of adding the flux, time of reaction between flux and melt, material used to thicken the flux, and minor variations in flux composition, studied. P and Al compared as deoxidants. Bronzes containing 9 to 10% Sn prepared from virgin or scrap metal, melted under the oxidizing flux, properly deoxidized, and cast so as to be free from shrinkage defects, can be extruded and subsequently cold rolled and cold drawn. Bronzes with 10 to 14% Sn can be hot or cold rolled. The wrought products have superior mechanical properties. 135 ref.

14-215. **Pours Finned Cylinders of Alloy Cast Iron.** Edwin Bremer. *Foundry*, v. 72, June '44, pp. 116-119, 260.

In compounding the sands to meet requirements imposed by the type of casting, such factors as permeability, shear, green and dry strength, flowability, etc., must be considered carefully, and varying amounts of different sands are used to meet the specific conditions.

14-216. **Oxy-acetylene Use in the Steel Foundry.** G. E. Bellew. *Foundry*, v. 72, June '44, pp. 120-122, 254.

Applications of oxy-acetylene processes in the steel foundry have provided the solution to many perplexing casting problems. Difficulties hitherto regarded as virtually unavoidable have been circumvented and large savings in time and expense have been achieved through resourceful utilization of newer methods. Introduction in most instances calls for no appreciable alteration in foundry routine.

14-217. **Melts 100 Tons of Bronze Daily.** *Foundry*, v. 72, June '44, pp. 127-129, 280, 282.

Description of plant layout.

14-218. **The Foundry Industry Looks to the Future.** *Foundry*, v. 72, June '44, pp. 123-126.

A study of wartime changes and postwar plans.

14-219. **Cupola Raw Materials.** H. W. Gillett. *Foundry*, v. 72, June '44, pp. 132, 270, 272, 274, 276, 278.

Differences between melting of steel and melting of gray iron in the cupola, effect of small amounts of elements, graphite nuclei theory, and effect of humidity.

14-220. **Increasing Gray Iron Production Through Modernization.** Edward C. Hoenicke. *Foundry*, v. 72, June '44, pp. 133, 264, 266, 268.

Methods for increasing production may be divided into two main categories: (1) Increased production resulting from better working conditions; (2) increased production because of new and better equipment and proper arrangement of present equipment.

14-221. **Around Detroit.** A. H. Allen. *Foundry*, v. 72, June '44, pp. 148, 151.

Michigan Steel Casting Co. establishes "Supercast" division for production of investment castings. . . Lower cost and better product compared with steel sand castings said to result from process on large runs. . . Automotive applications seen offering promising market prospects.

14-222. **Foundry Industry's Cooperation with Naval Research Laboratory Aids War Production.** A. H. Van Keuren. *American Foundryman*, v. 6, June '44, pp. 4-6.

Emphasizes the importance of industrial research for post-war planning and development.

14-223. **Fundamentals of Practical Sand Control.** Ralph Wertz. *American Foundryman*, v. 6, June '44, pp. 15-16.

The practical aspects of sand control, emphasizing the value of maintaining a record of sand control data and cleaning room conditions so that the results may be correlated. Production and sand control should function as a unit, with the flow from production to sand control and not from sand control to the foundry.

14-224. **Impregnation of Magnesium Castings.** H. K. DeLong. *Light Metal Age*, v. 2, May '44, pp. 10-11, 18.

The Styrene-Drying Oil Copolymer Process; the Tung Oil Process, and the Silicate Process for impregnating magnesium castings.

14-225. **Microshrinkage in Light Casting Alloys.** L. W. Eastwood. *Light Metal Age*, v. 2, May '44, pp. 12-14.

Microshrinkage in light metal casting is a defect which can be readily avoided when factors governing its formation are understood. Causes and methods of prevention.

14-226. **Utilizing the Centrifugal Casting Method.** S. D. Moxley. *Machine Design*, v. 16, June '44, pp. 131-134.

Gives favorable directional solidification; increasing the yield; exacting specifications met.

14-227. **Factors Influencing Design of Foundry Conveyors.** F. B. Henry and G. N. Wileman. *Machine Design*, v. 16, June '44, pp. 141-144.

(1) Friction parts should be entirely enclosed if possible, particularly those parts having high loads, due to the extreme abrasive nature of foundry sand and dust. (2) Points in the system where dry sand is transferred from one conveyor to another, or from conveyor to bins, should have properly designed chutes and hoods for removal of dust, steam, smoke, and gases. (3) Chutes and hoppers handling prepared or damp sand should have angles of at least 60°, rounded corners, and generous cleanout doors.

14-228. **Engineered for Machining—Part II.** John R. Ehrbar. *Die Casting*, v. 2, June '44, pp. 42-44.

A die casting cored in the upper half, or cover die, at right angles to the parting line and cored parallel with the parting line.

14-229. **A Symposium on Water-Quenched Steel Castings.** R. H. Swartz. *Steel*, v. 114, June 5, '44, pp. 104-106, 108, 164, 166, 168.

Equipment and requirements for water-quenched steel castings.

14-230. **Casting Steel Centrifugally.** S. D. Moxley. *Steel*, v. 114, June 19, '44, pp. 84-85, 148, 150, 152, 154.

Rapidly finding its place in production of high-quality engineering parts due to exceptional ability to turn out consistently sound homogeneous castings with high-physical properties.

14-231. **Evolution of Test Specimen for Non-Ferrous Castings.** A. J. Smith. American Society for Testing Materials Preprint 28, June '44, 11 pp.

The integrity of certain current "standard" test specimens for cast materials has been questioned by both producers and consumers. Historical development of several prescribed specimens, especially those for cast tin bronzes and related alloys. Specimens considered are shown to be inadequate as true "measuring sticks" since they frequently lead to deceptive results, and do not find justification based on a logical development background. Design and adoption of specimens according to sound metallurgical principles is advocated.

14-232. **The Laboratory and the Foundry.** D. Fleming. *Foundry Trade Journal*, v. 72, April 27, '44, pp. 345-350, 354.

Applying science to the whole field of foundry work.

14-233. **Control in the Magnesium Foundry.** G. Dean Leach. *Foundry Trade Journal*, v. 72, April 27, '44, pp. 355-356, 358.

The main steps of the operation and some of the control methods used are considered.

14-234. **Continuous Casting.** T. W. Lippert. *Scientific American*, v. 171, July '44, pp. 19-21.

A number of relatively simple and inexpensive machines have been perfected in which molten metal is poured into one end and continuous lengths of billets, sheet, or strip emerge from the other end. Practically all aluminum, magnesium, and copper alloys can now be cast in this manner, and experiments currently under way with steel show great promise.

14-235. **Aluminum Dies for Aluminum Castings.** *Light Metals*, v. 7, May '44, pp. 213-214.

Theory and practice, design and operation of anodized-aluminum permanent molds for gravity die-casting. 2 ref.

14-236. **Founding in Aircraft Construction.** *Light Metals*, v. 7, May '44, pp. 235-236.

Suggestions for planning efficient production of castings in any aluminum alloy.

14-237. **The Laboratory and the Foundry.** D. Fleming. *Foundry Trade Journal*, v. 73, May 4, '44, pp. 7-10.

Applying science to the whole field of foundry work. Part 2.

16. FURNACES AND FUELS

16-77. **A Quenching Furnace Suitable for Small Specimens.** E. A. Owen. *Journal of Scientific Instruments*, v. 21, April '44, pp. 65-66.

A furnace is described for the rapid quenching of small specimens, in lump or in powder form, from temperatures up to about 1000° C. The specimens are enclosed in small evacuated silica, pyrex, or soda-glass containers, according to the temperature quenched from, and these are mounted in holes bored in a steel block which is supported near the center of the furnace.

16-78. **Motor Generator and Electronic Units.** J. P. Jordan. *Metals & Alloys*, v. 19, May '44, pp. 1153-1154.

Fields of use of the motor-generator set and of the vacuum tube oscillator for induction heating with examples.

16-79. **Control for Electric Arc Furnaces.** L. V. Black. *Iron & Steel Engineer*, v. 21, May '44, pp. 35-41.

A prospective buyer analyzes the latest type. Analysis made from a study of prints, pamphlets, and literature published by manufacturers. Object is to explain, in not too much detail, the features of the various controls.

16-80. **Centralized Lubrication for Blast Furnaces.** A. J. Jennings. *Iron & Steel Engineer*, v. 21, May '44, pp. 42-46, 56.

Centralized lubrication on blast furnaces preserves equipment, reduces lost time, saves critical materials, and provides complete safety for the oiler.

16-81. **Advancement in Heat Application to Gas-Fired Furnaces.** James Kniveton. *Industrial Gas*, v. 22, June '44, pp. 13-16, 38-39.

New technique by which a multiplicity of small heat sources can be applied directly toward the objects heated; and arrangement of the heat sources in a very definite pattern in accordance with the heat requirements of the furnace.

16-82. **Blast Furnace Blowers Driven by Gas Turbines.** Paul R. Sidler. *Steel*, v. 114, June 5, '44, pp. 122-126.

Gas turbine-driven axial blower handles much larger air volume than furnace requires. Variation in speed is possible over wide range. Considerable part of compressed air is used for reducing temperature of combustion gases to desired limit.

16-83. **Metallic Recuperators Increase Heating Efficiency.** John H. Loux. *Steel*, v. 114, June 12, '44, pp. 116-118.

Preheating of air used for combustion affords higher flame temperature, more perfect combustion and more uniform heating of product. Fuel costs involved in bringing billets to proper temperature may be lowered by the exchange of heat.

16-84. **Heat Treatment Furnaces for Light Metals.** A. von Zeerleder. (*Schweizer Archiv.*, v. 9, '43, p. 197.) *Light Metals*, v. 7, May '44, pp. 249-256.

Theory and practice, design, operation and maintenance of heat treatment plant.

16-85. **Aluminum Aircraft Parts Heat Treated in Large Salt Bath Furance.** F. K. Whiteside. *Industrial Heating*, v. 11, June '44, pp. 892, 894, 896, 898, 900.

Pot dimensions, burner equipment, furnace construction and operating characteristics, control, piloting, safety equipment.

16-86. **Electrical Equipment (Other Than Busses) for Industrial Electric-Arc Furnaces.** Victor Paschkis. *Industrial Heating*, v. 11, June '44, pp. 902, 904, 906, 908, 910, 912.

Transformer and reactor equipment, furnace control, and control of electrode movement.

16-87. **Fuels of the Future.** R. A. Sherman. *Industrial Heating*, v. 11, June '44, pp. 922-924, 926.

Existing known supplies of coal, oil and natural gas, and the probable extent of their availability in coming years, along with suggested means for conserving and obtaining maximum utilization from these fuels.

17. REFRACTORIES AND FURNACE MATERIALS

17-23. **Report of Committee B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys.** American Society for Testing Materials, Preprint 15, June '44, 19 pp.

Tentative specifications for chromium-nickel-iron alloy castings for high temperature service for electric furnaces (B-44-T); test for equivalent yield stress of thermostat metals; tentative specifications for drawn or rolled alloys, 80% Ni, 20% Cr, for electrical heating elements (B82-T); and drawn or rolled alloys 60% Ni, 16% Cr, and balance Fe, for electrical heating elements (B83-T).

Metal Literature Review—*Continued*

17. REFRACTORIES (*Cont.*)

17-24. First Report on the Basic Cupola by the Melting Furnaces Sub-Committee. Institute of British Foundrymen, Advance Copy, Paper No. 803, 41st Annual Meeting, June 10, '44, 10 pp.

Previous work, use of stabilized dolomite as a lining and patching material, installation of the monolith, drying, patching, lining life, improving the life of stabilized dolomite linings, basic brick linings, desulphurization, preliminary melts with pig-iron, dephosphorization of steel scrap, wrought iron and pig-iron charges, lining wear, proposed lines for investigation, applications of the basic cupola.

17-25. Basic Refractories for the Copper Industry—I. R. P. Heuer and A. E. Fitzgerald. *Metals & Alloys*, v. 19, May '44, pp. 1133-1136.

Development and progressively increasing use of basic refractories for copper reverberatory furnaces. 14 ref.

17-26. Alumino-Silicate Refractories. J. H. Chesters. *Iron Age*, v. 153, June 8, '44, pp. 48-53.

Chemical composition, physical structure, properties and world distribution.

17-27. Reaction of Copper Reverberatory Slag on Different Refractories. S. S. Kocatopcu. Thesis for M.Sc. Degree, Massachusetts Institute of Technology, 1944.

17-28. Alumino-Silicate Refractories. J. H. Chesters. *Iron Age*, v. 153, June 15, '44, pp. 79-85.

Manufacture, properties, such as thermal expansion, torsion tests, spalling and slag resistance and applications in steel plants. 105 ref.

17-29. The Sillimanite Group of Minerals for High-Temperature Refractories. *Industrial Heating*, v. 11, June '44, p. 962.

The occurrence, properties and uses of the minerals kyanite, andalusite, sillimanite, and dumortierite, and the allied minerals topaz and pinite, in the manufacture of refractories that must withstand the high temperatures met with in numerous modern processes.

17-30. The Comparative Strengths of Ceramic and Other Insulating Materials. E. Rosenthal. *Electronic Engineering*, v. 16, May '44, pp. 505-507.

A resume of the more important electrical and mechanical characteristics of ceramics compared with those of other types of insulators.

18. HEAT TREATMENT

18-110. An Analysis of a Typical Carburizing Gradient. F. E. Harris. *Metal Progress*, v. 45, June '44, pp. 1111-1117.

Analyzes experiment on commercial carburizing steels and derives accurate values of the diffusion "constant".

18-111. The Self-Annealing of Copper. Maurice Cook and T. Ll. Richards. *Institute of Metals Journal*, v. 11, April '44, pp. 159-173.

Observations on the changes which occur spontaneously at room temperature in the X-ray and microstructure and in the physical properties of H. C. Cu strip with initial grain sizes of 0.015 to 0.02, 0.025, and 0.06 mm., and cold rolled with reductions in thickness of 80, 90, 95 and 97.5%. Spontaneous recrystallization at room temperature was observed only in those strips in which the average grain diameter of the crystals had been reduced to about 0.0008 mm. or less. In the recrystallization at room temperature, the structural change consists of a merging of the twin-fibre texture present in the cold-rolled strip to form the single-texture structure. The structure and properties of self-annealed strip are similar to those of strip which, when annealed normally, has a single-texture structure. 3 ref.

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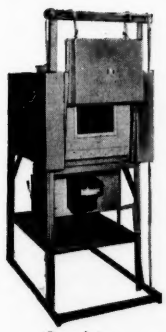

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18-112. Problems in Water Quenching. Miscellaneous Sized Steel Castings. W. B. Libert. *Foundry*, v. 72, June '44, pp. 130-131, 256, 258.

The practice followed at Continental Foundry & Machine Co. in treating castings of miscellaneous sizes.

18-113. Annealing Aircraft Parts in Pan-American Shops. F. K. Whiteside. *Iron Age*, v. 153, May 25, '44, pp. 60-61, 132.

Radiant heat used to anneal and harden aluminum alloy parts. Furnace design and operating methods discussed.

18-114. A Symposium on Water-Quenched Steel Castings. W. B. Libert. *Steel*, v. 114, May 29, '44, pp. 86-88.

Problems of water quenching of miscellaneous steel castings can be listed as follows: Care in loading to get uniformity of loads; positioning of the castings so as to eliminate steam or water pocketing; spacing of the castings to get maximum effect upon the quenching media; adequate blocking to prevent warpage; blocking off of sections critical from the standpoint of quench cracking; uniformity of heating and holding temperatures; speed of getting quench load from furnace into the quenching media; and proper quenching practice to get maximum properties from the steel used.

18-115. Quenching Large Steel Castings. R. A. Gezelius. *Steel*, v. 114, May 29, '44, pp. 88, 90, 92, 94, 96.

Liquid quenching of large steel castings has not been common practice until the past few years, probably due to two factors: (1) The popular opinion among consumers that liquid quenching of castings is a dangerous practice which will not produce satisfactory results, and (2) the common viewpoint that parts with varying thicknesses must be oil quenched. Factors which must be controlled and repeated time after time in as nearly the same manner as possible are: The temperature of the casting as quenched; the severity of the quench (*a*) water temperature, (*b*) water circulation; time of immersion in water; the temperature and time of tempering after quenching.

18-116. The Annealing of Steel. *Metal Treatment*, v. 11, Spring '44, pp. 29-36.

The modern conception of the annealing of steel is based on the knowledge of the rate of transformation of austenite. The application of time-temperature-transformation curves to the annealing of steel, giving explicit details on the construction of these curves and many actual examples for a wide variety of steels. The principles explained are the subjects of two U. S. A. patents but are made available by the holders to anyone wishing to use them.

18-117. The Use of Oil in the Heat Treatment of Steels. H. E. Priston. *Metal Treatment*, v. 11, Spring '44, pp. 62-64.

Surface effects produced when steel at a high temperature is quenched in liquid media. Outlines the essential properties of efficient oils, giving data relating to their depreciation and conditioning.

18-118. A Note on an Arrangement for Bright Annealing of Nickel and Other Metals. M. Balicki. *Journal of Scientific Instruments*, v. 21, April '44, pp. 67-68.

The batch of samples, with the hot-junction of the thermocouple in the middle, was placed inside a closed-ended, vacuum-tight silica tube surrounded with an iron sheet, pre-annealed in vacuum at 800°, was placed inside another long silica tube. The gap between the tubes was just sufficient to allow the passage of the wires of the thermocouple which were flattened by hammering, fully annealed and carefully insulated with mica. After loosely closing the external tube, it was placed in a long electric furnace in such a manner that the samples were in a zone of uniform temperature. By suitable construction the furnace had a linear heating characteristic and was automatically regulated. The temperature of the samples could be accurately determined or recorded.

18-119. Expansion of 24S Alclad Aluminum Sheet During Heat Treatment. William T. Kluge. *Automotive Industries*, v. 90, June 1, '44, p. 25.

Data on the expansion of Alclad 24SO and 24ST aluminum sheet resulting from one and two heat treatments, as determined by North American Aviation, Inc.

18-120. Heating Aluminum Billets by Low Frequency Induction. E. H. Plesset and J. R. Chadwick. *Iron Age*, v. 153, June 1, '44, pp. 52-54.

Low frequency induction heating may be applied advantageously to metals of low resistivity since the depth of heat generation is large and temperature gradients in complex shapes are avoided. Experimental procedures and results reported.

18-121. Continuous Heat-Treating Lines. A. C. Kramer. *Steel*, v. 114, June 5, '44, pp. 100-101, 154, 156.

Typical production heat treating line, including continuous hardening furnace, automatic quench and continuous tempering furnace, all connected by conveyors. Elevator-type automatic quench for continuous heat treating lines. Spray quench setup, suitable for handling armor plate, exit end. Pressure quench setup as installed in line for heat treating armor plate. Continuous tempering furnace for treating armor plate.

18-122. Design and Mass Important in Quenching Steel Castings. W. J. Phillips. *Steel*, v. 114, June 5, '44, pp. 110-171.

Requisite factors for a successful quench are: Steel of sufficient hardenability for the section size involved; quenching bath of such capacity and rate of flow that the surface of the piece being quenched approaches the temperature of the quenching medium; removal of the quenched part before its temperature has dropped below about 250° F. A successful quench will result only when the rate of temperature drop of the section exceeds the critical cooling rate of the analysis employed.

18-123. Interrupted Quenching. D. C. Miner. *Machine Tool Blue Book*, v. 40, June '44, pp. 129-130, 132, 134, 136, 138.

Development of method of "interrupted" quenching, in a bath of molten salt. How salt bath quenching minimizes distortion and cracking of steel parts.

18-124. Hardening With Precision. A. E. Shorter. *Engineers' Digest*, v. 1, May '44, pp. 347-349.

Shorter process precision method of surface or flame hardening and its advantages.

(Continued on page 12)

FOR pack annealing of their fine milling cutters, holders and bits, the O. K. Tool Company of Shelton, Conn. use Hevi Duty Roller Hearth Box Furnaces. Flexibility of loading combined with the precision operation of these furnaces are important factors in the production of their quality product.

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Metal Literature Review

18. HEAT TREATMENT (*cont.*)

18-125. Application of Controlled Atmospheres to the Processing of Metals. C. E. Peck. American Society of Mechanical Engineers, Paper No. 44-SA 24, June '44.

Principal types of atmospheres; equipment for producing atmospheres; auxiliary drying and furnace equipment; atmospheres for annealing, hardening, carburizing, brazing, sintering, of ferrous and non-ferrous metals.

18-126. The Tempering of Plain Carbon Steels. S. G. Fletcher. Thesis for D.Sc. Degree, Massachusetts Institute of Technology, 1943.

18-127. Tempering of Nickel and Nickel-Molybdenum Steels. D. P. Antia. Thesis for D.Sc. Degree, Massachusetts Institute of Technology, 1943.

18-128. Cyanide Nitriding of High Speed Steel Tooling. Albert W. Ehlers. *Tool & Die Journal*, v. 10, June '44, pp. 87-90.

Surface treatment of high speed steel by the use of controlled temperature salt solutions.

18-129. Working with Quenching Fluids. *American Machinist*, v. 88, June 22, '44, pp. 113-124.

Types of quenching fluids, quenching practice and equipment.

18-130. End-Quench Test Permits Rapid Evaluation of Steels. Charles M. Parker. *American Machinist*, v. 88, June 22, '44, pp. 91-94.

Possible interchangeability of various types of steel can be determined easily through use of end-quench hardenability test.

18-131. Working with Quenching Fluids. *American Machinist*, v. 88, June 22, '44, pp. 113-124.

Tempering, heat removal during quenching, water, sodium hydroxide solution, acid and acid solutions, brines, oils, specifications for quenching oils, air, heated salt and metal baths, other quenching mediums, quantity of quenching fluids required, temperature of the bath, surface condition of quenched part, agitation of the quenching bath, immersion methods, size of quenched parts, interrupted quenches, preventing distortion, quenching surface-hardened steels, cooling the quenching fluid.

18-132. Continuous Heat Treatment of Aluminum. J. O. Laws. *Iron Age*, v. 153, June 22, '44, pp. 58-60, 126.

Construction and operating data for what is probably the largest and most fully automatic unit used in aluminum heat treating in the aircraft industry.

18-133. Rifle Parts Heat Treated in Special Furnaces. *Iron Age*, v. 153, June 15, '44, pp. 74-78.

Two unconventional units installed at the Springfield Armory, one for automatically heat treating barrel forgings, the other an unusual bottom quenching furnace for hardening operating rod handles of the M-1 Garand semi-automatic rifle without distortion or scale.

19. WORKING

Rolling, Drawing, Pressing, Forging

19-150. The Effect of Rolling Temperature on the Mechanical Properties of a Magnesium Alloy. W. R. D. Jones. *Institute of Metals Journal*, v. 11, April '44, pp. 149-158.

Effect of rolling temperature and subsequent annealing on the mechanical properties of a Mg alloy. 16-gauge sheets were rolled at various temperatures from 1-gauge sheets which had been produced by hot rolling cast slabs and also slabs that had been extruded from a chill-cast circular ingot, teemed from the same ladle of molten alloy. It is shown that by hot rolling direct from cast slabs sheets can be produced which have properties at least equal, if not superior, to those produced from extruded slabs. Sheets rolled at 400° to 450° C. are self-annealing. Two rolling procedures may be recommended for the production of sheets with optimum mechanical properties: either (1) rolling at 400 to 450° C., or (2) rolling at any temperature above 200 and below 400° C., followed by annealing at 300° C. 2 ref.

19-151. 60 Mm. Mortar Shell Production Technique. Harry M. Heckathorn. *Iron Age*, v. 153, May 25, '44, pp. 42-44.

Pressing technique devised at the Mullins plant in order to avoid forging, machining and casting operations; production of 60-mm. mortar shells could rapidly be increased.

19-152. Stamping Precision Gears. G. Eldridge Stedman. *Steel*, v. 114, May 29, '44, pp. 82-83.

Many kinds of gears are made by improved stamping methods with such accuracy that backlash in gear trains is held to extremely close limits. Precision shaving and careful press "make ready" prove key to successful production.

19-153. Flame-Spinning Process. Thomas McElrath. *Steel*, v. 114, May 29, '44, pp. 84-85.

For closing tube ends now being used extensively in manufacture of war goods. Appears to be established as permanent and economical fabrication method.

19-154. Formed Stellite Reflectors for the Navy. Henry G. Horner. *Metals & Alloys*, v. 19, May '44, pp. 1129-1132.

Description of the use of ultra-hard non-ferrous alloys of the Stellite type for large Navy searchlight reflectors and the attendant development of methods of hot-rolling, hot-forming and finishing. Service requirements, the fabricating and finishing operations and the inspection methods involved in this application.

19-155. Airplane Tank Demonstrates Forming of Magnesium Sheet. W. G. Harvey and J. B. West. *American Machinist*, v. 88, June 8, '44, pp. 102-104.

Production rates for parts made from magnesium are comparable to those for aluminum articles when certain precautions are observed in design of press tools and the application of heat.

19-156. Carbine Sight Made from Brazed Stampings. *Iron Age*, v. 153, June 1, '44, pp. 47, 134.

Front sight for the cal. 0.30 carbine is now being made from rolled and stamped pieces that are brazed together instead of being machined from a solid forging. Cost is 45c, compared with 85c for the forging. Only press dies and forming equipment are needed for the re-designed sight.

(Continued on page 14)

Fort Wayne Chapter Receives Charter

Shown at the Speakers' Table, May 23rd Meeting, Fort Wayne Chapter A.S.M. (Left to Right): F. C. Lehman, Treasurer; E. J. Pavesic, Chairman; A. P. Ford, Western Representative of Metal Progress *Presenting the Charter for the National Office A.S.M.; G. A. Roberts, Vanadium-Alloys Steel Co., Speaker of the Evening; and J. D. Nisbet, Vice-Chairman.*

Few Fundamental Principles Govern All Tool Steel Types

Reported by J. A. Cameron
General Electric Co.

George A. Roberts, research metallurgist of the Vanadium-Alloys Steel Co., addressing the Fort Wayne Chapter on May 23 on "The Heat Treatment of Tool Steels," pointed out that while there are innumerable types of tool steels, they are all governed by a relatively few fundamental principles.

First, the iron-carbon diagram and the S-curve were explained. Martensite begins to form at the "M" point which varies with the carbon content of the austenite (about 400° F. for a 1% carbon tool steel). The amount of martensite which will form is dependent only on the temperature of the steel—that is, a certain percentage of the austenite will transform to martensite at a given temperature regardless of the holding time. Lowering the temperature will induce the transformation of more austenite to martensite.

All of the alloying elements commonly used in steel except cobalt shift the "S" curve to the right, thus promoting increased hardenability as high cooling rates are not required to miss the knee of the curve.

Dr. Roberts exhibited slides showing the position of several commonly used tool steels in ternary phase diagrams. These showed how the composition of the austenite is affected by the alloying elements and how certain combinations of alloying elements are conducive to large amounts of retained austenite, leading to a low as-quenched hardness and in many cases inferior performance of the tools.

In order for this retained austenite to decompose it is necessary to heat the steel to some elevated temperature and allow it to cool back to room temperature since it is during the cooling and not the heating or holding time that the austenite decomposes.

Several of the recent ideas on sub-zero treatment of high speed steels were mentioned. Sufficient data are not yet available to decide definitely which of the proposed treatments is superior to the others, but it does appear that such treatments lead to increased tool life in about 80% of the cases so far reported.

Before the technical meeting A. P. Ford of the A.S.M. National Office officially presented the Fort Wayne Chapter with its charter.

Following the technical meeting, the first annual meeting of the Fort Wayne Chapter was held at which time a constitution was adopted and officers elected.

Louis Teker of Leeds & Northrup Dies, Was in Charge of Purchasing

LOUIS TEKER, for more than 25 years in charge of purchasing for the Leeds & Northrup Co., and active in the Philadelphia Chapter of A.S.M., died suddenly June 11 at his home in Philadelphia.

Louis Teker

Born in Austria 54 years ago, he came to this country at an early age and was educated in Philadelphia schools and at Drexel Institute. In 1909 he entered the employ of Leeds & Northrup as a draftsman. After considerable experience in the designing of electrical measuring instruments, and the specifying of materials used in their construction, he was placed in charge of that company's purchasing department, a position he held since 1918.

Mathematics Provides Accurate Basis for Carburizing Process

Cementation—the process of converting wrought iron into steel by heating it to a bright red heat (2000° F. more or less) in contact with powdered charcoal—was so well known in olden times that a detailed account of it was written in 1540. This process of steel making has all but disappeared, yet case hardening survives as a most useful modern adaptation of the art. "Art" it is, as are most of the commercial practices that have come down from antiquity. Articles appearing in the technical literature, even today, describe the *art* of case hardening under specific conditions. Scientific discussion and experiment of the carburizing process, since Reaumur in 1720—and its close relative, the conversion of white to malleable iron—has established little more than that *gas* is required to transport the cement from the packing material to the steel—or vice versa.

The Italian metallurgist, Federico Giolitti, established in a series of important experiments just prior to World War I that the carbon oxides CO and CO_2 were the usual carburizing agents, and suggested that the penetration or amount of carbon at various depths below the surface depended upon the equilibrium between CO, CO_2 and gamma iron. The specific application of these principles to the gas carburizing process was not developed by him, nor had many metallurgists the mathematical skill or knowledge of physics to do it for themselves.

Harris Experiments Applied to Ordnance

However, this has now been done by F. E. Harris, furnace engineer for Buick at Flint, Mich. It is an extension of leisurely work that had been applied to automotive parts, but which had to be intensified in order to meet the very rigid requirements of ordnance parts, made during the last two years. The results are being published in a notable series of papers in *Metal Progress*.

The most recent one, "An Analysis of a Typical Carburizing Gradient" in the June issue, shows how the carbon-penetration curve of a bar of S.A.E. 1020, carburized 8 hr. at 1700° F., can be accurately predicted mathematically, on the assumption that carbon is absorbed, at the exact surface, up to the maximum solubility of carbon in austenite at that temperature, and then transported inward by the simple process of diffusion to regions of lower concentration. On the same basis it is possible to compute tables showing the case depths achieved for any time at any temperature above Ac_1, to predict carburizing and diffusing cycles for any surface carbon less than saturated austenite, and to foretell the effect of decarburizing atmospheres in the production of undesirable soft surfaces.

Future articles in the series, in addition to demonstrating these methods, will discuss modern furnaces for gas carburizing and bright hardening, equipment for atmosphere generation, and control instruments.

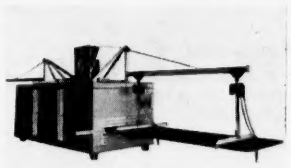
FOR SALE: One used Olsen Hydraulic Brinell testing machine and one used Steel City Hand Pump Brinell testing machine. Make offer. Box 7-1, The Metals Review, 7301 Euclid Ave., Cleveland 3, Ohio.

NEW PRODUCTS IN REVIEW

MAGNESIUM PREHEAT FURNACE

James H. Knapp Co.,
4920 Loma Vista Ave., Los Angeles 11, Calif.

This new magnesium preheat furnace will handle seven sheets of magnesium alloy up to 4 ft. wide, 12 ft. long and ¼ in. thick, with a temperature of 600° F. For maximum usefulness, it is self-contained and mounted on four casters for movement to the presses where the magnesium is to be hot formed. It provides for loading and unloading through seven double doors on either end. The standard unit has doors on each end.



Electrically heated and equipped with three blowers on one shaft, the heating elements extend the full furnace length. Using a Leeds & Northrup potentiometer recorder controller with special contacts, reduced heat input is provided for the soaking period, or for low temperature operation.

At the furnace ends, jib booms with chain hoists handle the hot tray loads. For moving convenience, they fold back over the furnace to make the overall dimensions approximately 9 ft. high, 9 ft. wide and 17 ft. long. With booms extended, overall length is about 38 ft.

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PRECISION GAGE INSTRUMENTS

Continental Machines, Inc.,
1301 Washington Ave., South, Minneapolis 4, Minn.

Until now, gage blocks have generally been used without the aid of supplementary precision instruments which greatly expand their application. Now, this company announces a complete line of gage instruments to fill the demand for a broader application of gage blocks. Constructed to the same accuracy as precision gage blocks, this new line of instruments assures the user of gage blocks of greater versatility in making precision measurements than possible with gage blocks alone, it is said.

The 20 instruments of the gage instrument set, in combination with gage blocks, will perform practically all precision measuring functions. With the gage holders and caliper bars, any type of "go", "no go" snap gage can be made up in a matter of seconds, accurate to millionths of an inch, and as easy to use as any standard snap gage. The instruments also provide tools to make a precision height gage, fulfilling all the duties of a standard height gage, yet 1000 times more accurate.

Included in the set are trammel points and center points, scribing arcs, optical flat and an adjustable vernier gage. Each instrument is supplied in a solid wood case or the entire set is available as a complete inspection laboratory, enclosed in a specially made walnut case. Illustrated information on the construction or use of any of the instruments can be obtained.

Mention R342 When Writing or Using Reader Service

SEALING COMPOUND FOR POROUS CASTINGS

Ault and Wiborg, Div. of Interchemical Corp.,
1754 Dana Ave., Cincinnati, Ohio

This company has developed a synthetic resin to impregnate and securely seal the tiny holes in magnesium, aluminum and other metal castings that have a tendency to be porous in nature. This synthetic resin is designed specifically for use with monomeric styrene. It is a 100% non-volatile compound, having a viscosity of Y-Z on the Gardner-Holdt scale. The usual mixing proportion is equal parts resin and styrene, though this depends somewhat on the porosity of the castings.

The recommended impregnating procedure for sealing porous castings is the usual vacuum-pressure method, where the vacuum removes the air from the casting and the compound is forced in under pressure. Variations, though, may be made in this technique to meet certain specialized conditions. After the casting has been impregnated, it is baked 2 hr. at 250 to 275° F. to polymerize the sealing compound. It is desirable to bake the casting under pressure. The usual industrial cleaners work satisfactorily to remove the synthetic resin-styrene solution from the outside of the castings, after impregnating and before baking the sealing compound. Resin is identified as No. 988 Magnesium Sealing Compound—Styrene Soluble.

Mention R343 When Writing or Using Reader Service

SMALL BARREL PLATING UNIT

Precimet Laboratories, 64 Fulton St., New York 7, N. Y.

The demand for a small compact barrel plating unit is met by this two-gallon "Barel-Cel". Although originally designed for the plating of precious metals, it is also used satisfactorily in copper, nickel, brass and silver plating.

This unit is simply constructed, consists of adjustable cathode and anode, a tilted tub which rotates slowly during the plating operation. The power unit electric motor can be plunged into any convenient outlet; no special wiring is necessary. The plating current supply to the unit is furnished by means of two wire leads that are fastened to the plating current bars. A special feature of the construction is the tub which is removable to permit flexibility in handling the solution, such as raising to the proper temperature before the plating operation.

The Barel-Cel is particularly suited to the plating of such small pieces as springs, catches, rings, ear wires, pins, screws, etc. There is no waste of materials. Several plating houses doing government work, have found the unit a time and labor saving device. Perhaps its outstanding advantage is its size, which is unique in the field of barrel plating. Pamphlets with further information may be obtained.

Mention R344 When Writing or Using Reader Service

PORCELAIN ENAMEL FINISH

Pemco Corporation, Baltimore, Md.

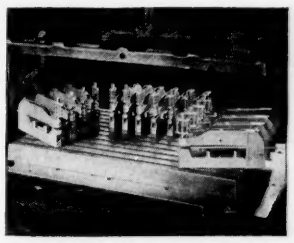
After more than 20 years of laboratory and field work, this company announces the development and release of what is said to be the first commercially successful one coat white—one fired—direct to steel porcelain enamel. Named "Mirac", this is a fully developed product that has been factory and field tested. It requires no special bond or pickling equipment. Nor does it need special handling. It has excellent adherence and can be fired at 1500° F., resulting in a brilliant, highly opaque finish. A complete analysis and further details are available.

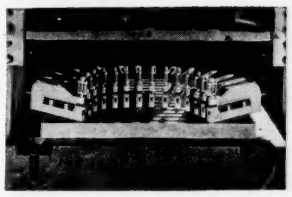
Mention R345 When Writing or Using Reader Service

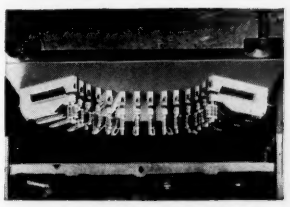
HOLE PUNCHING UNITS

Wales-Strippit Corp., North Tonawanda, N. Y.

New Type "BC" hole punching units have been designed to punch an unlimited number of straight-line, scattered and staggered hole patterns with varying center-to-center distances. Square sheared and curved sheets and long strips of flat material may be perforated with these units in short as well as long runs on a production basis.







A group of these units may be used interchangeably in press brakes and stamping presses by mounting on T-slotted plates, templates and rails. After a pattern has been run, the same group of units may be used in another hole punching pattern, thus eliminating dead storage of the units. In this way, only a minimum of units are required and the investment is kept in continuous productive operation.

Illustration No. 1 shows pattern setup of "BC" units on a T-slotted plate for punching holes along the edges of a square sheet of material; No. 2 is the same group set up to punch holes around the edge of a circular sheet; No. 3 is the same group mounted on template to punch a circular pattern of holes.

These units are equipped with 3-spring stripping guide assemblies which provide ample stripping pressure for punching holes up to 5/16 in. in diameter in material up to ⅛ in. thick. Throat depths of 4, 7 and 9 in. permit a wide range of pattern setups. Narrow holder width provides patterns of holes to be punched as close as 1 in. center-to-center.

An attractive new 8-page booklet presents further details on this equipment.

Mention R346 When Writing or Using Reader Service

More New Products on Pages 15, 17 and 19

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A.S.M. Review of Current Metal Literature—*Continued*

19. WORKING (*cont.*)

19-157. **Improved Explosive Rivet.** *Steel*, v. 114, June 5, '44, p. 130.
Helps plane builders to meet heavier schedules yet seeks a future on assembly lines for consumer appliances.

19-158. **A-C and D-C Drives for Draw Benches and Wire Blocks.** R. A. Geuder. *Iron & Steel Engineer*, v. 21, May '44, pp. 47-56.
Electrical equipment for draw benches and wire blocks varies with production requirements, power supply, flexibility, first cost and plant policies. The pros and cons of the various systems.

19-159. **Bloom and Billet Mills and Their Rolls.** F. C. T. Daniels and D. L. Eynon. *Iron & Steel Engineer*, v. 21, May '44, pp. 79-91.
Layouts of blooming and billet mills of various types with typical roll passes, and roll applications in these mills.

19-160. **New Developments in Forging Ferrous and Non-Ferrous Metals.** R. W. Thompson. *Iron Age*, v. 153, June 8, '44, pp. 54-57.
The rapid rise in the use of both ferrous and non-ferrous forgings has resulted in many new production problems. As a guide to these newcomers in this field, the author explains the different classes of forgings and describes methods for producing them.

19-161. **Precision Corrugation Dies.** James Walker and Carl C. Taylor. *Tool Engineer*, v. 13, June '44, p. 85.
Construction of a set of corrugation dies for 24-ST aluminum alloy, 0.040 in. thick, which will hold a 1½-in. center distance between two individual corrugations 48 in. apart, within plus or minus 0.020 in.

19-162. **Heavy Plate Sections.** R. L. Hartford. *Steel*, v. 114, June 12, '44, pp. 98-99.
Sections measuring up to 36 ft. long are readily formed on shop-built press. Novel press designed and built by Fort Pitt Bridge Works, Canonsburg, Pa.

19-163. **Forging Shot Caps with Gas.** A. D. Wilcox. *Industrial Gas*, v. 22, June '44, pp. 11-12.
Use of gas aids in production of a forging slug free of detrimental scale.

19-164. **Built-Up "Spinners."** G. Eldridge Stedman. *Steel*, v. 114, June 19, '44, pp. 86-88, 142, 144, 146.
Cut costs 50%; employ unique refabrication method by which parts are drawn after welding. This method is expected to increase the use of sheet steel in the production of many types of hollow shapes.

19-165. **Cam Type Forming Die.** S. E. Fishman and G. A. Keating. *Tool & Die Journal*, v. 10, June '44, pp. 91-93.
Development of a cam-type mechanical forming die, capable of drawing a 147½° closed angle flange around a 1½-in. radius without wrinkling or cracking.

19-166. **Molding and Fabricating Methods.** Warren V. Prince. *Tool & Die Journal*, v. 10, June '44, pp. 105-112.
Compression molding, injection molding of thermoplastic materials, injection molding of thermosetting materials—("jet" molding), transfer molding, high frequency heating, extrusion, drawing, casting, cold molding, laminating (high pressure), low pressure laminating, blow molding, swaging, forming, shaping, calendering, stamping, machining, cementing, welding, coating, impregnating, metal plating of plastics.

19-167. **Forged Cylinder Heads Require New Technique.** *Aviation*, v. 43, June '44, pp. 142-145, 248, 251.
How Wright Cyclone cylinder heads are cut out of a solid block.

19-168. **Methods for Forming Sheet Aluminum.** *Aviation*, v. 43, June '44, pp. 154, 159, 253, 255-257.
Specific examples showing ways of forming circular aircraft parts without resorting to the expense of dies or heavy drop presses.

19-169. **Introducing Essex Wire of California.** *Western Metals*, v. 2, June '44, pp. 18-20, 23-24.
New copper drawing and magnet wire plant at work.

19-170. **Safe Practices in Working Magnesium.** Arthur C. Stern and Charles B. Ford. *Iron Age*, v. 153, June 22, '44, pp. 64-70.
Approved safe practice recommendations for the prevention and control of fire and explosion hazards in magnesium alloy fabrication plants. Occupational health hazards that may exist in magnesium foundries from the presence of atmospheric contaminants such as fluorides, sulphur dioxide, carbon tetrachloride and chromium compounds. 12 ref.

19-171. **"Contoured-Cavity" Forging Method Developed for Large Caliber Shells.** *Industrial Heating*, v. 11, June '44, pp. 877-878, 880, 882.
General aspects of this method.

19-172. **Heating and Rolling in Bar Mills.** J. L. McHugh. *Industrial Heating*, v. 11, June '44, pp. 928, 930, 1020.
Heating furnaces and equipment, rolling mill equipment.

19-173. **The Design of Stamping for Quantity Production.** R. A. W. *Machinery* (London), v. 64, May 4, '44, pp. 487-491.
Details of stamping design. Drawn or formed notched parts. Locating holes in stamping design. Extruded holes in stampings. Lanced holes, louvres.

19-174. **Convair's New Tooling Plastic.** Thomas A. Dickinson. *Aero Digest*, v. 45, June 1, '44, pp. 100-101, 220.
A cold-pour, thermosetting cast phenolic plastic with filler added. It was created specifically to replace steel, aluminum, dural, and Kirksite in the making of hydropress form blocks, stretch forms, sinking dies, drill jigs, checking fixtures, lathe fixtures, and other machine tools used in the production of aluminum parts.

19-175. **Rolled Threads for Aircraft Engine Parts.** Franklin M. Reck. *Aero Digest*, v. 45, June 1, '44, pp. 114, 116.
Increasing use of rolled threads for aircraft engine studs, bolts, and capscrews should save considerable production time in the future.

20. MACHINING AND MACHINE TOOLS

20-192. **Drilling Aircraft Channels.** *Aircraft Production*, v. 6, May '44, p. 229.
Novel application of portable pneumatic drills.

20-193. **Radius Broaching of Turbine Buckets.** *Iron Age*, v. 153, May 25, '44, pp. 59, 132.
Turbine buckets are press-fitted to the wheel combination dovetail and tongue and groove mounting. The anchorage groove of bucket sections must be machined with high precision so that there will be full contact of the interlocking groove and tongue to assure rigidity in assembly.

20-194. **Predicting Machine Productivity for Future Applications.** G. B. Carson and L. C. Cole. *Mechanical Engineering*, v. 66, June '44, pp. 384-388.
Before a machine can reflect well-rounded design, it must show the results of a systematic and thorough correlation of (1) motion study; (2) machine design; (3) tool design; (4) search (experimental); (5) industrial design.

20-195. **Carbide Toolbits Give Good Results in Precision Boring.** Russ Hitz. *American Machinist*, v. 88, June 8, '44, pp. 96-97.
Speed and feed chart for precision boring machines.

20-196. **Special Taps Are Often a Requisite of High-Speed Precision Tapping.** Herman Goldberg. *American Machinist*, v. 88, June 8, '44, pp. 98-101.
Standard taps are not always suitable for precision tapping. Why and how taps function and reasons for special considerations.

20-197. **Don't Overlook Automatic Lathes for Turning Parts in Small Lots.** Bengt Branberg. *American Machinist*, v. 88, June '44, pp. 105-107.
Time-saving advantages of automatic lathes can be utilized by exercising care in applying the tools required, arranging cycles and organizing production.

20-198. **Practical Ideas.** *American Machinist*, v. 88, June 8, '44, pp. 108-112.
Square locating pin prevents damaged bushings. Drilling clean holes in thin sheet metal. Fixture for grinding circular form tools. Rods slotted with saw jig. Collapsible chuck key saves machine time. Cut-out squeezer fitted with stop gage. Shaft fitted with driving and locking keys. Portable motor has adjustable countersink. Retractable toolbit used for back chamfering.

20-199. **Machining the Barrel for the Light Carbine.** Frank J. Oliver. *Iron Age*, v. 153, May 25, '44, pp. 46-53.
Increasing the speed and power of standard machine tools and using carbide tipped tools has resulted in considerable increase in output. Use of carbide drills with high pressure coolant and coarse tooth reamers has helped speed up bore machining, together with broach rifling and automatic chambering operations.

20-200. **Production Milling.** *Automobile Engineer*, v. 34, April '44, pp. 137-144.
Servo-hydromatic millers for profile milling and rise and fall millers. Typical production applications also described. Details are given of various jobs carried out on plain hydromatic, servo-hydromatic and hydrotel milling machines.

20-201. **Contour Machining.** *Automobile Engineer*, v. 34, April '44, pp. 153-155.
Automatic sizing units designed for use in conjunction with Monarch engine or tool-room lathes. When a unit is fitted, the machine can be used either as an automatic lathe for step-shaft turning, step boring, step facing or any combination of step, taper and contour turning, boring or facing, or as a conventional engine lathe. Methods of setting up are discussed, brief descriptions are given of the various automatic cycles that can be employed and production data are included for two typical shaft turning jobs.

20-202. **Grinding Lead Screws Accurate to 0.0002 In. in 16 In.** J. R. Moore. *Iron Age*, v. 153, June 1, '44, pp. 42-46.
This article describes the elaborate techniques worked out over a period of years to achieve the ultimate in accuracy in the manufacture of micrometer screws for a small jig borer. Highlight of the method is the use of an electronic thermostat to maintain the temperature of the coolant and hence the work at a constant differential with respect to the master lead screw of the thread grinder.

20-203. **Machining Aircraft Parts.** G. Eldridge Stedman. *Steel*, v. 114, June 5, '44, pp. 102-103, 158, 160, 162.
Unusual problems which were solved in a unique manner by North American Aviation's Kansas City Plant.

20-204. **Machining Methods for Extreme Precision.** *Die Casting*, v. 2, June '44, pp. 45-50.
In some cases the intricacy of die casting leads to special machining problems. To retain the advantage of their use this manufacturer has developed several interesting machining set-ups and operations for die castings.

20-205. **Some Grinding Methods Used in Aircraft Production.** *Machinery* (London), v. 64, April 13, '44, pp. 406-409.
A series of illustrations showing how many problems in the manufacture of aircraft parts have been solved.

20-206. **The Production of the 5.5-Inch Howitzer.** *Machinery* (London), v. 64, April 20, '44, pp. 421-427.
Machining methods for the main parts.

20-207. **Interesting Operations in a Douglas Aircraft Machine Shop.** *Machinery* (London), v. 64, April 20, '44, pp. 431-436.
Fly-cutting with tungsten and tantalum carbide tool bits is coming increasingly into vogue. The fine finish and accuracy obtained with cutters of this type in machining aluminum has led to their fairly extensive adoption in finishing steel parts. This practice brings important economies in milling and grinding time, in addition to the advantages of high quality work.

20-208. **Controlling Machinability of Screw Machine Stock.** S. B. Knutson. *Iron Age*, v. 153, June 8, '44, pp. 62-65.
Experience with large tonnages of cold drawn alloy bar stock received from practically all major sources in the past two years has led to certain definite conclusions as to the metallurgical aspects of machinability of small caliber armor piercing bullet cores. Depending upon the stock diameter, definite limits have been set on the fineness of a spheroidized annealed structure and related tensile strengths. A new concept of "ridigity" has been set up.

20-209. **Grinding Lead Screws Accurate to 0.0002 In. in 16 In.** J. R. Moore. *Iron Age*, v. 153, June 8, '44, pp. 66-70.
Special equipment devised for checking tooth form and lead accuracy of precision screws. Use of a lead screw as a measuring device depends upon proper alignment with the nut and the several methods of achieving this are discussed, together with the factors involved.

20-210. **Automatic Sheet Layout Slashes Production Time.** Arthur Glade. *Tool Engineer*, v. 13, June '44, pp. 91-93.
Without tedious layout work in the shop, complicated sheet metal parts are produced accurately and swiftly through use of a semi-automatic layout mechanism applied to a standard indexing punch press.

20-211. **Mass Manufacturing for Interchangeability.** *Tool Engineer*, v. 13, June '44, pp. 76-84.
Production machining and assembly of gun mechanism, tooling for machining armor plate tank parts, machining on "in-line" production of aircraft parts.

20-212. **Carbide-Tipped Lathe Centers Reduce Rejects.** Delmer Rhino. *Tool Engineer*, v. 13, June '44, p. 94.
Proper application permits taking full advantage of longer life and closer tolerances in finish grinding and turning operations.

20-213. **Carbide Milling of Steel.** H. A. Frommelt. *Steel*, v. 114, June 12, '44, pp. 100, 102, 104.
Multitooth carbide-tipped cutters have attained a state of development which insures their beneficial use in peacetime for carbide milling of steel.

20-214. **Tool Control System.** *Steel*, v. 114, June 12, '44, p. 112.
Saves on grinding and handling, improves plant operating efficiency by reducing scrap and deviations, raises quality of finished product.

20-215. **Inserted-Tooth Milling Cutters.** *Engineering*, v. 157, April 28, '44, pp. 327-328.
The cutter is of the cup type with teeth set in the rim. The body of the cutter is of carbon steel and the teeth are of "Osbornite" sintered carbide brazed in place. The name given to the tool is the "Negraika" super-facing cutter, the name implying that the teeth are formed and set so as to give negative angles on the helix and face. It is stated that very high cutting speeds are obtainable with the cutter.

20-216. **Fundamentals in Milling Practice.** H. A. Frommelt. *Machine Tool Blue Book*, v. 40, June '44, pp. 143-144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176.
Three vital essentials include a good workpiece setup, proper choice and assembly of cutters, and correct operation of the machine.

20-217. **Special Grinder Applications.** John E. Hyler. *Machine Tool Blue Book*, v. 40, June '44, pp. 199-200, 202, 204, 206.
Remarkable increase in overall efficiency and versatility of machine shops, by use of portable grinding attachments.

20-218. **Recent Developments in Permanent Magnetic Chucks.** Charles D. Briggs, *Machine Tool Blue Book*, v. 40, June '44, pp. 263-264.
Finished magnetic device can be broken down into three components: 1—The magnetic "battery"; 2—The utilization of this force; 3—The adaptability of this force.

20-219. **Machining Steels on Automatics with Carbide Tools.** Carl W. Blade. *Machine Tool Blue Book*, v. 40, June '44, pp. 269-270, 274.
In applying carbide tipped tools to automatic screw machine operations on various grades of carbon and alloy steels, excellent results as to increased production, lowered machining costs and tool life can be obtained by adhering to certain basic rules.

20-220. **Machinability of Plain Carbon, Alloy and Austenitic (Non-Magnetic) Steels and Its Relation to Yield Stress Ratios When Tensile Strengths Are Similar.** E. J. Janitzky. American Society of Mechanical Engineers, Paper No. 44-SA 10, June '44.
Development of an index of machinability for rough turning. Relation between Taylor speed and yield stress ratios of the same tensile strength has been expressed mathematically and graphically.

20-221. **Machining Parts for the 5.5-Inch Howitzer.** *Machinery* (London), v. 64, April 27, '44, pp. 449-454.
Some of the principal machining operations on the saddle, the training base, and other main components of the gun. The saddle and training base are both fabricated from steel plate by welding.

20-222. **Operations in the Production of Marauder Bombers.** *Machinery* (London), v. 64, April 27, '44, pp. 457-460.
Development of special jigs for use on Erco punching and riveting machines.

20-223. **Machining Magnesium Alloys.** L. B. Whitburn. *Light Metals*, v. 7, May '44, p. 217.
Do's and don't's in cutting operations on the ultra-light alloys. General uses of these materials in the post-war world should profit by lessons learned from experience in aircraft construction during the war period.

20-224. **Carbide Milling of Steel.** H. A. Frommelt. *Iron Age*, v. 153, June 22, '44, pp. 52-57.
Illustrates some phenomenal gains in output and cutter life by the use of negative angle carbide milling cutters over high speed steel cutters and test data in chart form demonstrating the relation of lead or bevel angle and the number of pieces obtained per grind, and the relationship between spindle horsepower and depth of cut, feed rate and width of cut. Cutter life tests are summarized.

20-225. **Negative Rake and Carbides.** Arthur A. Schwartz. *Tool & Die Journal*, v. 10, June '44, pp. 83-86, 103.
Negative rake is only an expedient used to compensate for the one weak characteristic of all carbides, i.e., brittleness or lack of elongation.

20-226. **Modern Designs for Drilling Jigs and Tapping Fixtures.** *Tool & Die Journal*, v. 10, June '44, pp. 94-97.
Four common classes of thread fits which are in everyday use.

20-227. **Drill Block Locates Holes in Jig Clips.** *American Machinist*, v. 88, June 22, '44, p. 95.
Any inaccuracies will be shown by deviations in the indicator needle as each clip is tested.

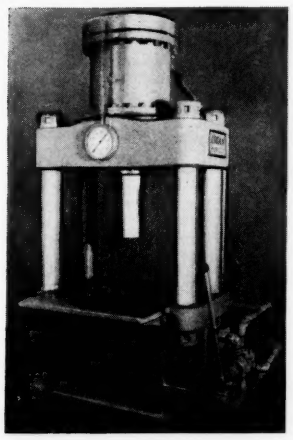
(Continued on page 16)

NEW PRODUCTS IN REVIEW

SPECIAL FOUR-POSTER PRESS

Logansport Machine Co., Inc., Logansport, Ind.

This special four-poster tie rod type hydraulic press is designed for heavy forcing and forming operations and, with a maximum ram opening of 30 in. and a 15 in. stroke, the press is adjustable to a wide variety of such operations.



A dual volume hydraulic pump provides low pressure operation during the non-forcing portion of the operating cycle and high pressure application during the actual forcing portion of the cycle. The change over from one to the other is accomplished automatically as demanded by the resistance to the ram. The proportional pressure valve permits the gradual application of pressing force in any degree from zero to full capacity. A special platen extension is provided to facilitate loading and unloading.

Mention R347 When Writing or Using Reader Service

Comparative service tests continue to prove convincingly that Kennametal lathe files multiply production, improve quality of work, and effect substantial savings in the cost of files used. For example, on the job illustrated above:

A mill cut steel file, employed to remove the sharp edges from the 400 Brinell steel part, wore out on about 100 pieces. A Kennametal file turned out 800 pieces the first day—stayed on the job two weeks—and produced 15,000 pieces. The Kennametal file cut a curling chip—did not scrape or skid—and provided a finish that was almost as smooth as a grinding job!

Kennametal lathe files outlast steel files 50 to 200 times, because their surface is made of the same hard, cemented carbide composition as steel-cutting Kennametal-tipped tools. They permit filing speeds 3 to 10 times those possible with steel files—doing an outstanding job on cast iron and brass at surface speeds around 900 feet per minute, and on high-carbon, high-chromium steels at 800 surface feet per minute. The keen, sturdy teeth of a Kennametal file will make a clean, true cut on steels up to 62 Rockwell C, a hardness that ordinary files cannot touch.

The value of any tool is measured by the quality and quantity of work it produces. The higher original cost of Kennametal lathe files is insignificant compared to the tremendous economies effected through their use. Order one today for test purposes—let it prove its merit in your shop.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc. LATROBE, PA.

Kennametal Lathe Files are now furnished in two sizes—11" or 14" long—and each size is available with either 20 or 30 teeth per inch. The 11" size (F-76, 30 teeth/inch; F-77, 20 teeth/inch) having a filing surface 4" long x ¾" wide, costs $12.50. The 14" size (F-86, 30 teeth/inch; F-87, 20 teeth/inch) having a filing surface 6" long x ¾" wide, costs $18.50. All sizes can be shipped promptly.

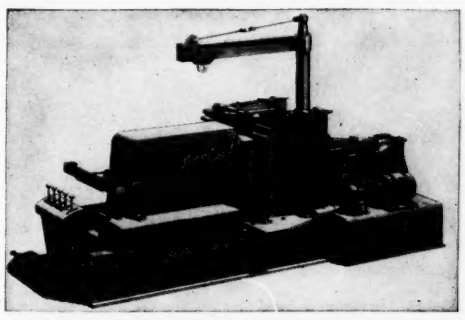
Mention R348 When Writing or Using Reader Service

TANGENT BENDER

Struthers Wells Corp., Titusville, Pa.

This improved tangent bender is said to be unique in its ability to edge bend sheet metal in the lighter gages. "Tangent bends" in many convenient forms can be bent cold in one operation. The metal is smoothly upset so that no further finishing is required.

Many types of new streamlined steel equipment can be produced with this equipment, such as refrigerator cases, kitchen cabinets, stoves, boxes, metal furniture, bathroom equipment, airplane and automobile parts.



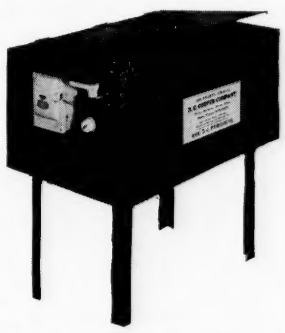
The machine is definitely designed for improved edge beveling, but when there is no production for this particular work, it can also be used as a horizontal 50-ton press for blanking, piercing, forming, embossing and many other continuous operations. Bulletin No. 53 T illustrates many applications and features.

Mention R349 When Writing or Using Reader Service

ELECTRICALLY HEATED DIP TANKS

D. C. Cooper Co., 18 E. 18th St., Chicago 16, Ill.

A line of tanks especially adapted for heating rust preventives, wax, cleaning, degreasing, stripping and washing compounds has been developed here, and is widely used in preparing metal parts for protective coatings so necessary for overseas shipment.



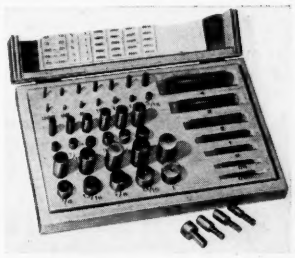
Thermostat control maintains required uniform temperature. Sturdily built, the units are insulated on four sides and bottom, and equipped with drain. They are available for prompt delivery in standard sizes of 5, 12½, 30, 60 gal. and larger. Special tanks for heating Ethyl-cellulose are also available.

Mention R350 When Writing or Using Reader Service

EMERGENCY PLUG GAGE BLANK SETS

The George Scherr Co.
200 Lafayette St., New York 12, N. Y.

This New Atlantic Emergency Set contains 36 cylindrical plug gage blanks in steps of 1/16 in. with handles as illustrated. This set will permit any shop to produce any size plug gage from 0.029 to 1.000 in. in just a few minutes work on a cylindrical grinding machine. These blanks are oil hardened throughout, shank finish ground, and centers on both ends are lapped. Thus, it is necessary only to grind the blanks to produce a commercial finish gage. Where higher standards and closer tolerances are involved, the gages are then lapped. An illustrated 4-page leaflet gives further details.



Mention R351 When Writing or Using Reader Service

AUTOMATIC SAFETY TONGS

Heppenstall Co., Pittsburgh, Pa.

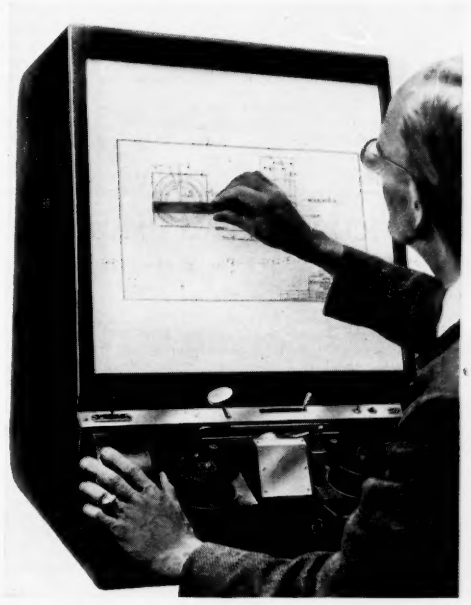
The present ordnance drive to increase production of large shells and other munitions has blazed the way for a new use of this company's automatic safety tongs. These tongs, which pick up, land and release a load simply by raising and lowering the crane, are being fitted into the production line from the hot forging of the shell to its final machining. The tongs grip and hold the shell and carry it from operation to operation without marring the surface and without the slightest danger of releasing it prematurely. They facilitate handling, increase the safety factor and make it unnecessary for human hands to touch the shells.

Mention R352 When Writing or Using Reader Service

TRANSLITE HI-REDUCTION MICROFILM PROCESS

Microcopy Corp., 2800 West Olive Ave., Burbank, Calif.

A simple and economical method of condensing and preserving vital records for an indefinite period is announced in the Translite Hi-Reduction process. This process is the application of microfilming to engineering drawings, as well as any other valuable record, document, drawing, map or material kept in industrial manufacturing plant files. Because of the high-fidelity translite feature, it is particularly adaptable to engineering drawings, in pencil or transparent paper.



Microcopy, being a photographic record, is a faithful copy of the material microfilmed. The negative can be used to make copies on other pieces of film. The negative can be used to enlarge and make copies of the original in any size desired. These copies may be made on tracing paper, cloth or film.

For reading Microcopy, a multiple-magnification viewer is supplied in various models. This viewer, operated on a motion picture film projector principle, is operated simply from a control panel. Complete details on this new equipment are presented in a new bulletin, "Hold Everything."

Mention R353 When Writing or Using Reader Service

GRAPHIC WEIGHT RECORDERS

Toledo Scale Co., Telegraph Rd., Toledo, Ohio

Graphic weight records in permanent form are available with Toledo Scale models equipped with graphic recorders. These records may be referred to either during the weighing operation or at a later date. They show weight of each material and also the time at which it passed over the scale. In weighing batches, this permanent weight record tells what weights have gone into the batch and when. Both the management and the scale operator have tangible proof as to whether instructions have been carried out. This type of controlled weighing provides an easy means of making corrections, accurately, without waste of materials.

The recorder, clock-driven and mounted on top of the scale dial housing, may be either of two types. Circular recorders show the weight and time of weighing on a 10-in. disc. The disc makes a complete revolution either in 24 hr., or in seven days, whichever is specified. A second type, the strip recorder, has a strip 100 ft. long and rates of travel varying from ¾ in. per hr. to 12 in. per hr. Because of its length, the strip type recorder can be operated at higher speeds than would be practical with the circular recorder, offering particular advantages where it is desired to record a maximum number of weights.

Mention R354 When Writing or Using Reader Service

A.S.M. Review of Current Metal Literature — *Continued*

20. MACHINING (*Cont.*)

20-228. **Many Factors Besides Taps Affect High-Speed Precision Tapping.** Herman Goldberg. *American Machinist*, v. 88, June 22, '44, pp. 98-101.

Each tapping operation should be studied as to material cut, percentage of thread, tolerances, lubricants and machine ranges to produce satisfactory work.

20-229. **How Can Machine Tools Be Improved?** H. T. Johnson. *American Machinist*, v. 88, June 22, '44, pp. 105-106.

Ten questions and answers on machine-tool design.

20-230. **Practical Ideas.** *American Machinist*, v. 88, June 22, '44, pp. 107-112.

Clamp exerts 20 tons pressure. Micrometer head added to a planer gage. Microscope locates layout points on rough castings. Drilling fixture has equalizing stop. Short shells cut from large tubing. Extractor pulls hat-sections from die channels. Prevents scratching of sheared aluminum sheet. Drill jig fitted with screw jack. Taper plug gages checked with sine bar. Stud puller for close quarters. Retooling saves 6240 man-hours.

21. CLEANING AND FINISHING

21-72. **Annotated Bibliography of Aluminum Cleaning.** Jay C. Harris and Robert B. Mears. American Society for Testing Materials *Bulletin*, No. 128, May '44, pp. 35-40.

The information which has been abstracted comprises various types of commercial cleaning methods, means for inhibiting corrosion, and descriptions of published laboratory techniques for the evaluation of metal cleaning detergents.

21-73. **Improving Zinc Chromate Primer Adhesion.** J. F. Mason. *Products Finishing*, v. 8, June '44, pp. 60-62, 64, 66.

Maximum zinc chromate primer adhesion can only be obtained by application on metal surfaces which have been cleaned thoroughly. In the case of subsequent primer or final finish coats applied over an aged detail primer coat, it is very important to abrade or scuff the hardened primer to insure a good bond. The use of aluminum wool is recommended for this operation.

21-74. **Flame-Priming for Paint Wear.** Clyde B. Clason. *Welding Engineer*, v. 29, June '44, pp. 40-43.

Many maintenance man-hours can be saved if the paint job is done right the first time. Flame-priming lifts off all loosely bonded scale, dehydrates rust, provides a hot, dry surface for application of the paint coat.

21-75. **Finishing Scout Cars and Tank Destroyers.** Gordon Robertson. *Metal Finishing*, v. 42, June '44, pp. 385-386.

Finishing operations on the scout cars and tank destroyers have been developed to a high degree of specialization and mechanization. From the time that stamped, machined, forged or cast parts leave the machine area until the time they arrive at the proper storage area adjoining the main assembly line they are handled, cleaned and finished by conveyor. Three distinct major finishing systems. First, there is the chassis line which is actually the final assembly line. Frames are riveted together and mounted on an endless chain traveling at floor level. The chassis moves along, picking up engine, transmission, etc., until it is complete except for the body. It then enters the paint spraying chambers which are open at both ends and equipped with water wash curtains lining both walls. As it passes through the booth, the chassis is given a finish coat of lustreless olive drab specification enamel.

21-76. **The Industrial Pickling of Metals.** P. D. Liddiard. *Chemical Age*, v. 50, May 6, '44, pp. 435-438.

Theory and the practice. 4 ref.

21-77. **The Finishing of Light Alloys.** *Chemical Age*, v. 50, May 6, '44, pp. 440-441.

A factor affecting post-war utility.

21-78. **Cleaning and Descaling Steel by Electrolytic Pickling in Molten Caustic Soda.** N. L. Evans. Iron & Steel Institute Advance Copy, April '44, 23 pp.

Electrolytic treatment in molten caustic soda imparts to the steel a mild degree of resistance to rusting, and hydrogen is not absorbed. Finding the optimum conditions of time, temperature and current density, and the occurrence and prevention of brown stains on the work. Certain electrical conditions in the plant have been investigated, and their bearing on plant design is discussed.

21-79. **New Method Developed for Processing Wire & Strip in Molten Glass.** J. J. Caugherty. *Steel*, v. 114, June 19, '44, pp. 102-104, 106.

New procedure for cleaning ferrous metal coated with lead includes heating the material to oxidize the lead coating and form lead oxide, coating the piece with glass, and cooling it so that the glass will separate and carry the lead oxide with it, thus leaving a clean surface on the steel. Process eliminates usual pickling, annealing and de-leading operations and is suitable for various grades of wire and strip steel.

22. WELDING, BRAZING AND FLAME CUTTING

22-246. **Welding Is the Way in Our Fighting Ships.** *Industry & Welding* (Welded Products Ed.), pp. 13-24.

The Naval Limitation Treaties of the 20's and 30's were the impetus behind the whole research program which led to a new conception of welding in ship construction. The process made possible more speed and fire power without increasing over-all tonnage beyond the limitations of the treaties. Navy experience in this work gave the background necessary for swinging American shipyard production into high gear when the Maritime Commission demanded 16,000,000 tons of new shipbuilding for 1943.

22-247. **Rough, Tough and on Time.** *Industry & Welding* (Welded Products Ed.), pp. 29-36.

Producing armament at a rate unparalleled in history. Welding bears a large responsibility in this accomplishment.

22-248. **These Above All.** *Industry & Welding* (Welded Products Ed.), pp. 41-48.

In plans for the immediate and distant future the welding processes are assuming great importance in aircraft construction.

22-249. **New Things on Wheels Better on the Long Haul.** *Industry & Welding* (Welded Products Ed.), pp. 53-64.

Future automobiles and trains will be lighter, stronger, more economical to operate and better looking. Welding processes make this possible.

22-250. **Where It Takes Strength and Precision and Flexibility.** *Industry & Welding* (Welded Products Ed.), pp. 67-78.

No more striking example of the strength and flexibility inherent in the mass production of tools can be found than in the manufacture of contractors' equipment and in the machinery field. By taking advantage of welding these products are being made faster and cheaper, without jeopardizing quality.

22-251. **The Hottest Flame Known to Man.** *Industry & Welding* (Welded Products Ed.), pp. 87-94.

No more versatile tool can be found than the oxy-acetylene flame, which has multitudinous applications in virtually every phase of industry. This vast usage has become increasingly important with the impact of war work.

22-252. **Structural Steel Tames the Giants.** *Industry & Welding* (Welded Products Ed.), pp. 97-108.

Development of steel bridges and buildings has entailed research and study in the proper placement of metal for long life and safety. Heavy engineering projects of this kind have begun, comparatively recently, to use welded structural steel—placed where it will do the most good—to meet the problems of fighting or using nature for man's own purposes.

22-253. **New Highs and Lows for Our Chemical World.** *Industry & Welding* (Welded Products Ed.), pp. 117-128.

Essential welding to enable us to reach new highs and lows in our chemical world.

22-254. **Maintenance and Repair—a Major Industrial Problem.** *Industry & Welding* (Welded Products Ed.), pp. 137-144.

The welding method of repair has long since passed beyond the realm of fixing a furnace or automobile frame and has graduated into a real tool to keep American industrial activity at its highest pitch.

22-255. **Universal Jig and Clamp.** *Steel*, v. 114, May 29, '44, pp. 100, 102.

These are found to be widely adaptable for many welded constructions.

22-256. **Arc Welding Electrodes.** W. Andrews. *Welding*, v. 12, April '44, pp. 186-193.

The modern electrode for electric arc welding is a vital factor in welded production. Study of the developments in electrode manufacture; various types of electrodes and their differences are clearly defined.

22-257. **Welded I-Sections.** H. Gottfeldt. *Welding*, v. 12, April '44, pp. 194-196.

Graphical solutions to design problems.

22-258. **Welding Research.** W. C. E. Barnes. *Welding*, v. 12, April '44, pp. 197-201.

Laboratories of the Arc Manufacturing Co.

22-259. **Prefabricated Farms.** G. Herrick. *Welding*, v. 12, April '44, pp. 202-203.

Welded units for mass produced dwellings.

22-260. **Control of Moisture in Electrode Coatings.** R. V. Anderson. *Iron Age*, v. 153, June 1, '44, pp. 48-51.

Absorption of moisture by electrodes seriously affects the quality of arc welds and is a real problem in shipyards where the relative humidity in coastal areas is seldom less than 70%. After carrying out some laboratory experiments on electrode drying, this shipyard has developed a system for storing electrodes under controlled conditions up until the time they are actually used.

22-261. **Resistance Welding Controlled Precisely by Electronic Tubes.** T. R. Lawson. *American Machinist*, v. 88, June 8, '44, pp. 91-95.

Vast wartime production enlarges field of electronic control in fabricating sheet-metal parts. Functions of tubes explained and compared with older control devices for industrial operations.

22-262. **Broken Press Frame Casting Redesigned to Welded Steel.** W. J. Conley. *Iron Age*, v. 153, June 8, '44, pp. 58-59.

Replacing a cast iron frame which failed due to overload with a welded steel unit increased the safe load capacity by 66% at a weight saving of 20%.

22-263. **Shadow of the Future.** T. B. Jefferson. *Welding Engineer*, v. 29, June '44, pp. 35-39.

Impressions of basic problems which will confront industry in general and welding in particular in the postwar world.

22-264. **Brazing Armature Coils.** C. Lynn. *Welding Engineer*, v. 29, June '44, pp. 44-46.

Soldered and brazed necks, joints air-cooled, brazing advantages, armature coils, cutting down brazing time, the brazing head, brazing procedure, portable equipment, cross connection joints.

22-265. **Teaching Wilma to Weld.** Roy J. Quinn. *Welding Engineer*, v. 29, June '44, pp. 47-49.

Comprehensive account of what is involved in teaching a lady to become a ship welder.

22-266. **Welded Processing Machine.** L. J. Schwartz. *Welding Engineer*, v. 29, June '44, pp. 66, 68, 70.

Both strength and rigidity had to be obtained in a machine to process insulation material for buildings. An arc-welded structure gave both and resulted also in a considerable dollar saving in production costs.

22-267. **Sheet-Steel Stamping Assemblies Produce Economies in Production.** D. H. Gaston. *Product Engineering*, v. 15, June '44, pp. 364-367.

Use of sheet-steel stamping assemblies and other simplifications in redesigning structural parts, especially where furnace copper brazing can be employed, have resulted in drastic savings in man-hours, faster production, and usually reductions in weight without sacrifice in strength of parts.

22-268. **The Welded Joint in Non-Ferrous Chemical Plant.** W. K. B. Marshall. (Paper at Joint Meeting of Institution of Chemical Engineers & Chemical Engineering Group of the Society of Chemical Industry, March 14, '44.) *Engineers' Digest*, v. 1, May '44, pp. 339-340.

Physical discontinuity can be said to exist if it is possible to detect a difference between the parent metal and the joint by any form of mechanical test. Chemical discontinuity exists when it is possible to detect a difference between the joint and the parent metal by chemical methods, such as etching or corrosion tests.

22-269. **Two-Tone Welding.** J. A. Cunningham. *General Electric Review*, v. 47, June '44, pp. 24-28.

New process speeds up welding as much as 300%; use of filler bars.

22-270. **Silver Brazing Electrically.** Edwin G. Ryan. *General Electric Review*, v. 47, June '44, pp. 40-41.

For precise electrical measuring devices. So firmly bonds lead wires to coils that the joint resistance is stable. Method of application simple.

22-271. **The Deposition of Hard-Facing Alloys by Welding.** P. L. Pocock. *Metallurgia*, v. 29, April '44, pp. 289-292.

The value of hard facing is increasingly appreciated largely as a result of developments in materials and in the technique of welding them to suitable base materials required to resist wear, corrosion or both. Fusion welding of hard alloys.

22-272. **The Investigation of Microstructures of Single-Bead Chromium-Nickel Austenitic Weld Deposits on S.A.E. 4340 Plus Vanadium Steel.** Anton Louis Schaeffler. Thesis, University of Wisconsin, June '44.

22-273. **The Effect of Furnace Deoxidation Practice on Atomic Hydrogen Weldability of S.A.E. 4330 Steel.** Nevzat Altan Gökcen. Thesis for M.S. Degree, University of Pittsburgh, June '44.

22-274. **Welding in Postwar Steel Construction.** La Motte Grover. *Iron Age*, v. 153, June 15, '44, pp. 71-73.

Arc welded fabrication vs. riveted construction in postwar building. Consensus is that welding is fine for plate fabrication but not so applicable to straight fabricated structural steel.

22-275. **Cuts Soldering Time 997%.** *Steel*, v. 114, June 19, '44, p. 98.

Soldering job formerly took 16 min., but with the introduction of induction heating, the time was reduced to 2½ sec. Preliminary preparation of the cans and covers, which are stamped or drawn from terne plate, is simply to apply flux, to allow the solder to run freely and adhere to the base metal. The condenser element is inserted into the can, and its leads electrically fastened to the terminals, which are brought through the cover of the can.

22-276—**Welding as Applied to Track Work on the L.M.S. Railway.** N. W. Swinnerton and Hugh O'Neill. *Institute of Welding Transactions*, v. 7, March '44, pp. 1-15.

Reconditioning of worn and damaged switches and crossings, welding plant and electrodes, procedure for switches and crossings, welding of electric track components, welding of rails together for running track, welding of other track components, rail steel and metallic arc welding, gas welding on rail steel, features of welded rail joints, precautions to be observed. 9 ref.

22-277. **Some Notes on the Welding of Non-Ferrous Metals.** N. P. Inglis. *Institute of Welding Transactions*, v. 7, March '44, pp. 16-27.

Main features which must be recognized in the welding of Cu, Ni, Al, Ag and their alloys in common use, and some of the inherent difficulties associated with the welding of them. 9 ref.

22-278. **Machine Tools Modernized Through Arc Welded Motor Drives.** John P. Berkeley. *American Machinist*, v. 88, June 22, '44, pp. 102-104.

Welded steel motor drives give better service, can be made to fit application better and cost considerably less than cast iron drives made for comparable use.

23. INDUSTRIAL USES AND APPLICATIONS

23-167. **Wrought and Cast Magnesium for Airframes.** V. N. Krivobok. *Metal Progress*, v. 45, June '44, pp. 1104-1110, 1132.

Considers, from a metallurgical viewpoint, the proposal that wrought and cast magnesium might be more extensively used in fighting airplanes.

23-168. **Manufacture of Homogeneous Armor, Both Cast and Rolled.** D. O. Davis. *Metal Progress*, v. 45, June '44, pp. 1081-1087.

Changes in peacetime operations necessary to produce gun tubes, armor plate and other heavy ordnance material at Dominion Foundries & Steel, Ltd.

23-169. **Needle Roller Bearings.** E. V. Paterson. *Automobile Engineer*, v. 34, April '44, pp. 147-150.

Notes on their application and maintenance.

23-170. **Producing Jackets and Primers for 0.30 Cartridges.** *Machinery* (London), v. 64, April 13, '44, pp. 393-401.

Manufacture of the bullet jackets and primers; the assembly of the bullets and of the complete cartridges; and the automatic weighing and inspection of the finished cartridges.

23-171. **Steel Separators for Gun Mount Bearings.** *Iron Age*, v. 153, May 25, '44 p. 45.

Substitution of pressed steel roller separators for bronze separators has resulted in considerable weight saving in large size thrust and radial bearings.

23-172. **Twelve General Considerations for Needle Bearing Applications.** Walter H. Korff. *Product Engineering*, v. 15, June '44, pp. 389-392.

High load-carrying capacity and small space requirements are among the advantages of needle bearings for many applications. Limitations and differences in characteristics from other types of bearings are included.

(Continued on Page 18)

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Equally effective in still tank and electro-plating

Turco Prosolv *B* insures chemical and physical cleanliness essential to 100% bonding to steel or zinc, cadmium, chromium, etc. Removes all oil, grease, paint, smut, rust preventive compound. Contains no soap; leaves no deposit. Rinsing is complete, although parts may have dried.

This outstanding new material may be used for still tank, anodic and cathodic cleaning, which simplifies plant procedure where both processes are employed.

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Heavy duty Toledo Dynamometer Scale (Model 9711) used in airplane engine tests.

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● A new 52-page Reference Book of Dynamometer Scales provides a wealth of helpful information on dynamometers of many types; illustrates recent installations, and describes in detail the wide range of modern dynamometer scale equipment. Send for this book. Toledo Scale Company, Toledo, O.

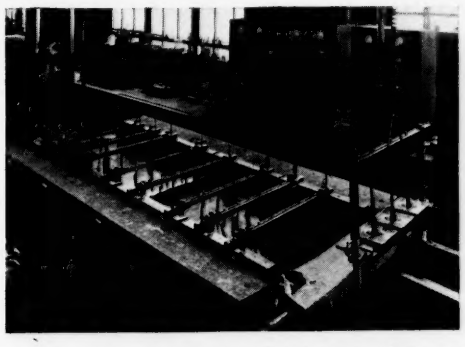
TOLEDO SCALES

Mention R357 When Writing or Using Reader Service

NEW PRODUCTS IN REVIEW

PLATING EQUIPMENT OFFERED BY NEW COMPANY

Industrial Hard Chromium Plating Equipment Corp., 13 Rome St., Newark, N. J.



Plating equipment said to be based upon entirely new principles of design and operation is now offered by this company, headed by William A. Crowder. The new equipment is expected to save hours of job preparation time, do away with complicated anode fabrication, and relieve the need for skilled operational labor. This new equipment will not only eliminate the need of conforming anodes, but facilities now incorporated will also allow for the plating of a number of different types of machine parts in the one electroplating tank, according to Mr. Crowder.

Mention R358 When Writing or Using Reader Service

NEW TRUCK-MAN

Yard-Man Inc., Jackson 89, Mich.

A new Truck-Man, designed for moving skidded loads of one ton or under, introduces features providing safe, efficient moving of today's war and tomorrow's postwar materials.

Easier, safer operation and greater flexibility have been built into the new, improved one-ton capacity Truck-Man. One of the important improvements is a patented two-speed drive which makes both a low and a high speed instantly available. The low speed is adapted for starting, climbing ramps, going in and out of freight cars or other tight places, and for moving material over rough floors. For light loads and movement without loads, the high speed is instantly available.

The Truck-Man turns in its own length and steering is improved by a large ball thrust bearing which reduces steering effort. Other improvements include heavier load wheels with a 4-in. tread and a larger gas tank of one gallon capacity which provides sufficient fuel for 8 hr. of normal operation.

Mention R359 When Writing or Using Reader Service

STEEL GRAB

Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

This new steel grab provides a positive and easy method of handling steel plate or structural forms in various shapes and sizes with edge thicknesses up to ⅝ in. It has a rated capacity of three tons, and each unit is subjected to a proof of five tons before being released from the factory. An important feature is the simple principle of operation and quick method of attachment, which permits the use of the device for either lifting vertically or pulling horizontally. When the grab is hooked and pressure applied, two powerful, many-toothed jaws close securely on the sheet and hold it tightly until the lift or pull is completed. The action of the jaws, operating on the principle of a pair of tongs, is such that the heavier the load, the tighter the grab.

Further details on this unit, including its all-welded case construction, are available in a new bulletin.

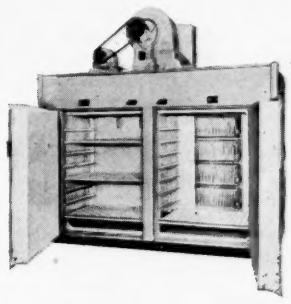
Mention R360 When Writing or Using Reader Service

RECIRCULATING ELECTRIC OVEN

Gehnrich Oven Div., W. S. Rockwell Co., New York, N. Y.

A new down-flow recirculating type electric oven has been developed which presents the combined advantages of forced convection heating and rapid recirculation. This method of heat distribution is particularly desirable for objects which are hollow and open at the top or can be arranged on trays or suspended from cross bars in such a manner as to permit the heated air to sweep down over the work so as to expose each piece to the same heating conditions throughout the oven. Designed originally to preheat hollow magnesium castings, it is also applicable in process drying, finish baking and heat treating operations at any temperature to 1000° F.

This oven is a two-compartment unit, but can be built as single or multiple compartment units of any desired size. Heating is provided by electric heaters mounted at the rear wall of each compartment but separated from the heating chamber by an easily removable, insulated panel. Motor-driven fan mounted at the top of the oven blows the heated air through a distribution duct at the top of the oven interior, with the air moving down through the work, passing through the floor, back through the heater space and up to the fan intake. This continuous recirculation at the rate of 28 or more complete air changes per minute assures uniform heat saturation of the work. Auxiliary equipment includes temperature control with thermocouple and alarm temperature limit switch to prevent overheating and a switch which interlocks the heat supply and circulation systems.



Mention R361 When Writing or Using Reader Service

ELECTROPLATING COMPUTER

Hanson-Van Winkle-Munning Co., Matawan, N. J.

A new and wholly original aid to the electroplater and plating chemist has been made available with an instrument called the Jernstedt Electroplating Computer. It is said to do for the plater what the slide rule accomplishes for the engineer—makes use of logarithmic scales to eliminate lengthy calculations. Accuracy of control and a minimum loss of time are the results.

The instrument computes chemical additions required in a plating bath of any gallonage, including cyanide additions. It indicates weight of metal deposited on unit area, given the thickness. It lists usual cathode efficiencies of all modern electroplating solutions; gives plating time required to deposit a given thickness of any metal; computes current density required to produce a deposit of given thickness; indicates thickness of deposit resulting from an established plating time at a known current density. Full instructions and details of the operation are available on request.

Mention R362 When Writing or Using Reader Service

OPTI-FLAT SURFACE PLATE

George Scherr Co., 200 Lafayette St., New York 12, N. Y.

Latest addition to this company's line of precision and inspection tools is the new Opti-Flat, a highly accurate optical glass master surface plate, flat to an accuracy of 50 millionths of an inch. It has been generally established that measuring tools, gages, jigs must be approximately ten times more accurate than the work. If the work is expected to be accurate within ±0.001 in., your measuring equipment must be within 0.0001 in. or better. This requirement is now more than met by the new Opti-Flat. This surface plate is extremely resistant to abrasion and is 2 in. thick for the 12-in. and 3 in. thick for the 16-in. size to prevent warpage and breakage. It is inspected by means of optical flats by light interference methods enabling the operator to check for flatness within millionths of an inch. Opti-Flats are annealed and free from strain, and will not distort over a period of time.

Mention R363 When Writing or Using Reader Service

A.S.M. Review of Current Metal Literature—*Continued*

23. INDUSTRIAL USES (*cont.*)

23-173. **Light Alloy Pistons.** C. Wilson. (*Automobile Engineer*, v. 34, Feb. '44, pp. 53-8.) *Engineers' Digest*, v. 1, May '44, pp. 337-339.

Materials, forging methods, molding technique, press forming, molding dies.

23-174. **Larger Output of Zinc Alloy Die Castings in Years Following End of War Envisioned.** S. E. Maxon. *Metals*, v. 14, May '44, pp. 6-7, 11.

Sees enormous demand for consumer and industrial items; more and better facilities now available to meet needs.

23-175. **The N. E. Steels in the Post-War Era.** Edwin F. Cone. *Metals & Alloys*, v. 19, May '44, pp. 1122-1128.

The primary question about NE steels is: "Are they here to stay or will they be largely replaced after the war?" 8600 and 8700 series are expected to be the "fair-haired" boys. Reasons for a lessened relative post-war demand will be (*a*) the fussier heat treating behavior of the NE steels, (*b*) the psychology of favoring the familiar over the new or strange, (*c*) NE steel overpricing, so that either the lower prices of the "needled" carbon steels or the better properties of the higher alloy steels become more attractive, and (*d*) sales pressure from the alloy producers.

23-176. **Fabricating and Finishing the New M-1 Soldier's Helmet.** *Metals & Alloys*, v. 19, May '44, pp. 1137-1140.

A pictorial description.

23-177. **Spark-Gap Converters.** Frank T. Chestnut. *Metals & Alloys*, v. 19, May '44, pp. 1155-1156.

Concise engineering information about the applicability of spark-gap converters.

23-178. **What's the Future for "Maggie".** W. B. Griffin. *Light Metal Age*, v. 2, May '44, pp. 15-18.

List of potential post-war consumers and uses of magnesium, which has been compiled from the information gathered from recent business surveys; direct contact with prospective consumers and present users.

23-179. **Ancient Speculum Returns to Provide Tomorrow's Spoons and Forks.** *Tin & Its Uses*, No. 15, March '44, pp. 9-10.

The use of Speculum to meet a war demand promises to precipitate a revolution in post-war tableware.

23-180. **Gear Manufacturers Approve New Standards.** *Iron Age*, v. 153, June 1, '44, pp. 59-61.

New officers elected, statistical method favored, contact pressure analyzed, bearing problems, postwar labor conditions.

23-181. **Mass Production of Small Fine Pitch Gears.** *Machine Tool Blue Book*, v. 40, June '44, pp. 183-184, 186, 188, 190.

Bringing mass production methods such as "gear-shaving" along with extremely high standards of precision into the field of manufacturing small fine-pitch gears for high precision military instruments by Ford Motor Co.

23-182. **Burgess Norton Now Produces Aviation Piston Pins and Tank Treads.** Joseph Geschelin. *Automotive Industries*, v. 90, June 1, '44, pp. 18-21, 152, 154.

Plant operation has been divided into a number of self-contained departments. First is the machine shop in which the variety of pins are prepared in the "soft" stage. Next is a comprehensive heat treating department featuring some of the most advanced equipment and metallurgical methods known to the art. And finally there is the finishing department for handling grinding, honing, lapping, etc.

23-183. **A Wartime Conversion.** D. W. Powers. *Die Casting*, v. 2, June '44, pp. 19-21, 48-50.

Use of die castings in the manufacture of field telephones was inaugurated by the Signal Corps, U. S. Army, in an attempt to conserve critical raw materials. Describes some of the designs successfully employed.

23-184. **A War Housing Project.** *Die Casting*, v. 2, June '44, pp. 22-24.

Eclipse-Pioneer Division of Bendix Aviation Corporation has found die casting is superior to high grade sand castings for well over 100 applications in instruments and other products.

23-185. **The Use of Die Castings in the Small Motor Industry.** Howard F. Doll. *Die Casting*, v. 2, June '44, pp. 36-41.

Die casting is not only the most advantageous process for the production of housings, but is virtually the only sound basis for high volume precision production in this field.

23-186. **Switch to Die Castings.** A. L. Riche. *Die Casting*, v. 2, June '44, pp. 54-55.

In many applications the die cast housing serves both as mechanical protection and also as a functional support for operating mechanisms. Example described is condulet for micro switch case.

23-187. **Quick-Acting Fasteners.** R. W. Allen. *Steel*, v. 114, June 19, '44, pp. 100, 130.

Developed for aircraft use, they may find many peace-time applications.

23-188. **Refrigerated Barges Made by National Iron Works.** Harold Keen. *Western Metals*, v. 2, June '44, pp. 32-33, 35.

There is no precedent for these particular refrigerated barges, erected in unique knockdown fashion.

23-189. **Light Metals in the Automobile.** E. V. Pannell. *Light Metals*, v. 7, May '44, pp. 209-213.

Standardization, importance of light weight, how the light car performs, does the light car hold the road, the light metals available, design of the light-alloy car.

23-190. **Light Alloys in Marine Engineering.** E. C. Goldsworthy. *Light Metals*, v. 7, May '44, pp. 218-221.

Possible applications of light alloys, together with their advantages.

23-191. **Aluminum and Magnesium in the Electrical Industries.** B. J. Brajnikoff. *Light Metals*, v. 7, May '44, pp. 221-223.

Use of the light alloys in electrical engineering. The application of aluminum for overhead transmission lines. Steel-cored aluminum cable will probably eventually be displaced by "solid" conductors of light alloys of special composition.

23-192. **Light Metals in the Medical Sciences.** *Light Metals*, v. 7, May '44, pp. 224-235.

Commonplace and unusual applications of these materials, as for example in dentistry.

23-193. **Copper Conductors for Transmission Lines.** *Engineering*, v. 157, May 5, '44, pp. 352.

Main types of hollow conductor.

24. DESIGN

24-29. **Design Rules—IV.** Herbert Chase. *Die Casting*, v. 2, June '44, pp. 31-32, 34.

Keep sections as thin as possible; maintain uniform thickness of sections; if section thickness must vary, make transitions gradual.

24-30. **The Design of Stampings for Low Frequency Transformers.** R. Mawson. *Electronic Engineering*, v. 16, May '44, pp. 514-516.

After obtaining an expression by which the relative merits of stamping shapes may be compared, this formula is used in the following ways: To determine the optimum core area and position of the core; to determine the optimum stamping when one dimension is fixed; to determine the optimum shape of the stamping for a given area. A second formula is used to determine the shape of the stamping giving the maximum inductance for a given wire size.

25. MISCELLANEOUS

25-132. **Control of Low Temperature Refrigeration.** A. B. Newton. *Refrigerating Engineering*, v. 47, June '44, pp. 461-464, 496, 498.

New industrial uses of low temperature refrigeration control systems which have proved most useful in wartime manufacture.

25-133. **Keying Research to Battle.** G. M. Barnes. *Mechanical Engineering*, v. 66, June '44, pp. 359-362.

Ordnance department responsibilities, industry prompt and vigorous, new weapons, weapons for special needs, rifles superior, "results speak for themselves," aircraft cannon, American bazookas, best mobile artillery, howitzer fire devastating, effective bombs, body armament for aviators.

25-134. **Heat Transfer: Conduction, Radiation and Convection.** Herman J. Stoever. *Chemical & Metallurgical Engineering*, v. 51, May '44, pp. 98-101, 106-107.

Lists the more important simple equations and explains briefly their derivation and use.

25-135. **Engineers Need More Than Mere Technical Capacity.** J. L. Perry. *Mining & Metallurgy*, v. 25, June '44, pp. 291-293.

Asserts that engineers must be more proficient in human engineering. They must be better organizers, develop a better sense of team play, widen their interests and activities, and they must take more responsibility for successful management.

25-136. **Practical Problems of Postwar Mineral Industries Education.** J. W. Stewart. *Mining & Metallurgy*, v. 25, June '44, p. 293.

It appears entirely possible that we may expect a temporary lowering of prewar standards at many schools.

25-137. **Order Scheduling in a Specialty Tube Mill.** Norman F. Rearic. *Steel*, v. 114, May 29, '44, pp. 110-112, 114, 116, 130-131.

Controlled materials plan employed by tubemaker to expedite numerous orders through various phases of treatment is responsible for delivering 85% of all commitments scheduled for manufacture in a given month as promised. Each step of the procedure is explained in detail.

25-138. **A New Federal Service Offered to Small Manufacturers.** Maury Maverick. *Product Engineering*, v. 15, June '44, pp. 361-363.

How the Technical Advisory Service of the Smaller War Plants Corp. obtains answers to technological problems facing small plants not equipped with research laboratories. Operation of this government agency is described with an announcement that it "will soon offer the means of opening the doors to many new essential non-military products and inventive ideas."

25-139. **Methods Engineering in the Metal Industries.** Edwin Laird Cady. *Metals & Alloys*, v. 19, May '44, pp. 1145-1149.

Control of methods will profoundly influence the speed and efficiency of reconversion in the transition and post-war periods. Examples of its applications in the metal industries.

25-140. **A Shop Liaison System.** *Steel*, v. 114, June 5, '44, pp. 112, 114.

Gets production and design improvements from idea form to actual use in one-tenth the ordinary time.

25-141. **Bar Storage System.** H. C. Morrison. *Steel*, v. 114, June 5, '44, pp. 116, 118.

Eliminates much individual handling of bars, facilitates moving into and out of storage, has interesting possibilities for all screw machine departments.

25-142. **Selecting Synchronous Motors.** K. M. Patterson. *Steel*, v. 114, June 5, '44, p. 120.

Simplified by tabulation of torques, starting kilovolt-amperes and reduced starting kilovolt-ampere methods for low and high speed 60-cycle motors.

25-143. **Research for Aeronautics.** W. S. Farren. *Aircraft Engineering*, v. 16, April '44, pp. 106-111.

Planning and application.

25-144. **Screw Threads.** *Aircraft Production*, v. 6, May '44, p. 209.

Proposals for an international system.

25-145. **The Tin Research Institute's Activities in Post-War Years.** John Ireland. *Tin & Its Uses*, No. 15, March '44, pp. 17-18.

The problem involved, semi-industrial investigations, technical information bureaus, suggested location of bureaus, development and publicity, the council of control.

25-146. **Production Planning and Control.** L. J. King. *Iron & Steel Engineer*, v. 21, May '44, pp. 57-61, 78.

Production planning and control seek to answer the what, when, where and how of manufacture, so that products, service and costs will be the best possible.

25-147. **Materials Weight Tables.** *Tool & Die Journal*, v. 10, June '44, pp. 97-101.

Designed to reduce to a minimum the work of calculating the total weight of steel required for a given press run, the tables are readily applicable for other materials and purposes.

25-148. **Magnesium Dust Hazard.** *Light Metals*, v. 7, May '44, pp. 237-239.

Safety precautions required in the machining of the ultra-light alloys in order to avoid unnecessary risks associated with these materials in the finely divided form.

25-149. **Convair Machine Sorts 50,000 Rivets Hourly.** *Aviation*, v. 43, June '44, pp. 152-153, 296.

Dual-feed mixed-rivet unit developed at Consolidated's Nashville plant.

25-150. **Steel Simplification.** Earl Adkins. *Steel*, v. 114, June 19, '44, pp. 94, 97.

With its company simplification program just begun, the author reports a 20% reduction in number of different steels stocked, with significant savings already being obtained.

25-151. **Heat Effects in Lubricating Films.** A. C. Hagg. *Journal of Applied Mechanics*, v. 11, June '44, pp. A-72-A-76.

Heat effects in lubricating films analyzed on the basis of simple shear of the lubricant, Reynolds logarithmic formula relating lubricant viscosity and temperature, and an equation relating the heat generation and heat flow in the film. The film-temperature dependence on velocity determined, and the result used to obtain the shearing stress and shearing rates. An approximate means for judging the importance of film heating in a given case in terms of velocity and lubricant viscosity is suggested.

25-152. **Shrink-Fit Stresses and Deformations.** A. W. Rankin. *Journal of Applied Mechanics*, v. 11, June '44, pp. A-77-A-85.

The expressions for the stresses in a solid cylinder of infinite length caused by the action of an applied radial stress distributed uniformly over a single circumferential ring of finite length on the surface of the cylinder. Test measurements of shaft deformations due to shrink pressures are included to illustrate the application of the theoretical results. 9 ref.

25-153. **Improvised Equipment for the Toolroom.** R. Harries. *Machinery* (London), v. 64, May 4, '44, pp. 477-483.

With the help of a skilled fitter, the small concern can improvise some of its own toolroom equipment. Some designs for such measuring equipment. Shows methods of construction.

25-154. **Measurements of the Adhesion Component in Friction by Means of Radioactive Indicators.** B. W. Sakmann and J. T. Burwell and J. W. Irvine. *Journal of Applied Physics*, v. 15, June '44, pp. 459-473.

In friction experiments material is exchanged between the sliding surfaces. The development of a radioactive tracer method by means of which one could detect quantities of metal as small as 10^{-4} microgram. After the friction experiments, the riders were tested for the presence of radioactive material, and the quantity of metal deposited on the rider was determined as a function of various parameters. A copper-beryllium base surface was used for all measurements reported here.

26. STATISTICS

26-61. **Saving and Substitution of Critical Materials.** (*La Technique Moderne*, v. 35, Sept. '43, pp. 133-136.) *Engineers Digest*, v. 1, May '44, pp. 358-359.

Cement with barium partly taking the place of calcium. Concrete and iron tubes replace cast-iron tubes. Gutters in bakelised wood replace zinc.

26-62. **Stockpiling—Vital to National Security.** Juliand Conover. *Mining Congress Journal*, v. 30, May '44, pp. 30-33.

Excess supplies of strategic and critical minerals at end of war are NOT surplus property to be disposed of but part of the nation's permanent wealth to safeguard our future security.

26-63. **Molybdenum—Its Applications in the Mining Industry.** Telfer E. Norman. *Mining Congress Journal*, v. 30, May '44, pp. 36-38.

Molybdenum alloy steels find many uses in mining machinery and equipment.

26-64. **U. S. No Longer Self-Sufficient in Zinc Ore; May Have to Import 200,000 Tons a Year.** Thomas H. Miller. *Metals*, v. 14, May '44, pp. 15-16.

Post-war estimated consumption ranges between 650,000 and 850,000 tons; foreign metal will be required to meet needs.

26-65. **Copper Consumption Off in U. S.; Post-War Surplus Scrap Looms as Big Trade Problem.** L. H. Tarring. *Metals*, v. 14, May '44, pp. 15-16.

Little change in tin; lead curbs to continue; zinc supply satisfactory.

26-66. **Four War Years Mark Great Strides in Aircraft Manufacture.** R. A. Trumpis. *American Machinist*, v. 88, June 8, '44, pp. 113-122.

A review of production practices from 1941 to 1944 shows how war requirements were achieved and reflects current trends in the plants of airframe manufacturers.

26-67. **British Iron Ore and Ironstone.** G. V. Standerline. *Mine & Quarry Engineering*, v. 9, May '44, pp. 119-123.

Pre-war output of British ores of 14½ million tons is now well exceeded.

27. NEW BOOKS

27-59. **Principles of Powder Metallurgy.** (Tr. from the German by Marion Lee Taylor) Franz Skaupy. 80 pp., illus., Philosophical Library, New York. $3.00.

A description of the process of caking or cohesion by which metal powder is changed into compact metal shapes.

27-60. **The Metallography of Meteoric Iron.** Stuart H. Perry. 213 pp., illus., (U. S. Natl. Mus. Bull. 184) '44, Smithsonian Institute, Washington, D. C. Paper $.60.

27-61. **Mineral Resources of Minnesota.** William H. Emmons and Frank K. Crout. 149 pp., maps. (Minnesota Geological Survey Serial.) University of Minnesota Press, Minneapolis. $1.00.

Metal Literature Review

NEW BOOKS (*cont.*)

27-62. The Craftsman Prepares to Teach. David Frederick Jackey and Melvin L. Barlow. 192 pp. (2p. bibl.) Macmillan, New York, $2.00.

To assist those from industry who are now being called upon to train workers and who have never before had experience in teaching.

27-63. Composite Aircraft Manufacture and Inspection. Leno C. Michelon. 558 pp., illus., Harper, New York, $6.00.

A discussion of the basic materials from which composite aircraft are produced, with their Army-Navy Aeronautical Specifications, the processes of manufacture, and inspection instruments and methods. Certain chapters were written with the collaboration of 2nd Lieutenant Raymond J. Devereaux.

27-64. Kurzgefasstes Handbuch aller Legierungen. Ernst Janecke. 505 pp., illus., J. W. Edwards, Ann Arbor, Mich. $13.15.

27-65. The Physical Chemistry of Electrolytic Solutions. Herbert S. Harned and Benton B. Owen. 611 pp., diag., American Chemical Society Monograph Series, Reinhold Publishing Co., New York City. $10.00.

27-66. Manual of A.S.T.M. Standards on Refractory Materials. Prepared by A.S.T.M. Committee C-8 on Refractories. 201 pp., illus., American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa. Heavy paper cover $1.50; cloth $1.75.

Specifications, classifications, methods of testing, definitions, standard samples, industrial surveys, procedure for calculating heat losses. Includes new standards for air setting refractory mortars, fireclay plastic refractories both for boiler and incinerator services, methods of test for measuring the shrinkage, spalling, and workability index of fireclay plastic refractories, and a method for measuring the thermal conductivity of insulating firebrick.

27-67. Marine Pipefitting. Vern E. Hase and Ralph W. Allen. 325 pp., illus., McGraw-Hill Book Co., New York. $3.00.

Describes and pictures all major piping systems on ships and the best methods of installing them. Modern shop practice in pipefitting is clearly set forth, with detailed explanation of how to bend pipe, and with a new and practical approach to mechanical and mathematical piping layout.

27-68. Mathematical and Physical Principles of Engineering Analysis. Walter C. Johnson. 346 pp., illus., McGraw-Hill Book Co., New York. $3.00.

Presents the essential physical and mathematical principles and methods of attack that underlie the analysis of many practical engineering problems. Emphasis is placed upon physical concepts, the use of assumptions, procedures in setting up equations, use of mathematics as a tool in accurate and quantitative reasoning, and the physical interpretation of mathematical results.

27-69. Hackh-Grant Chemical Dictionary. Julius Grant, 3rd Ed., 925 pp., illus., The Blakiston Co., 1012 Walnut St., Philadelphia 5, Pa. $12.00.

Provides concise definitions based on latest research findings, clear account of theories, rules and laws of chemistry; describes elements, compounds, drugs, minerals, etc.; lists reactions processes and methods; mentions chemical apparatus, equipment and instruments.

27-70. Wear—A Discussion of the Mechanism of Wear Phenomena and Influencing Factors. D. Landau. 46 pp., illus., The Nitralloy Corp., 230 Park Ave., New York 17. Free.

The mechanism of wear; wear and physical properties; molecular adhesion; surface melting; specific pressures; lubricants and wear; galling; scoring, fretting; gear pitting; work hardening; chemical effects; wear in; wear out; wear of Nitralloy vs. other steels; surface finish and wear.

27-71. Experimental Stress Analysis, Vol. I, No. 2. Addison-Wesley Press, Inc., 517 Kendall Square Bldg., Cambridge 42, Mass. $4.00.

A compilation of papers given at the Conference on Experimental Stress Analysis in New York in December, 1943.

27-72. Mechanical Properties of Metals and Alloys. Staff of National Bureau of Standards. Circular C 447, 480 pp., Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. $1.50.

Summary of results of a comprehensive survey of the technical literature on strength and related properties, thermal expansion, and thermal and electrical conductivities of ferrous and non-ferrous metals and alloys at normal, high and low temperatures. 4172 metals and alloys listed.

27-73. The Law of Copyright and Literary Property With Forms. Horace G. Ball. Over 1000 pp. Matthew Bender and Company, Inc., 109 State St., Albany 1, N. Y. $22.50.

Deals with basic matters, fair dealing, common law, originality, procedure, forms, rules, and acts, words and phrases, interpretations, and various related subjects.

Gages Manufactured and Checked Accurate to Two Millionths Inch

Reported by S. B. Knutson

St. Louis Ordnance Div., McQuay Norris Mfg. Co.

That there is more to the application of precision gages than meets the eye was apparent after the May meeting of the St. Louis Chapter A.S.M., when Harry R. Ball, manager of the DoAll Southern Co., St. Louis, spoke on "Precision Measurements in Industry."

The use of optical flats of fused quartz was illustrated and Mr. Ball told how it is possible to manufacture and check gages accurate to two millionths of an inch.

Two very good sound pictures were shown and many types of gage blocks and instruments were put on display and demonstrated.

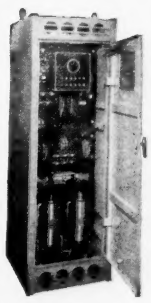
NEW PRODUCTS IN REVIEW

NEW SEAM WELDING CONTROL

Industrial Control Div., General Electric Co.,
Schenectady, N. Y.

A new control designed exclusively for seam welding, and incorporating a completely electronic timing circuit, is announced by this company. Designated as Type CR7503-B110, the new resistance welding control is especially suitable for operations where frequent changes of the timing pattern are required, such as when welding a variety of materials of various shapes and thicknesses.

Operating on a 230/460/575-volt, single-phase, 60-cycle power supply, the control consists of a timing panel, a firing and a heat control panel, and a power panel, any one of which can be separately disconnected and removed to facilitate inspection or servicing. An electronic circuit, incorporated in the control, provides accuracy of the timing pattern of the weld—without utilizing moving parts and regardless of normal, instantaneous, or gradual line-voltage variation. Smooth heat control is provided by the phase-shift method.



The complete control is mounted in a floor-type enclosure, the full-length front and rear doors of which can be locked. A calibrated heat-control dial is located on a compact panel readily accessible through a flap opening in the front door of the enclosure. Snap switches for providing easy, instantaneous, and independent adjustment of the "heat" and "cool" time in one-cycle steps from 1 to 30 cycles are also located on this panel. Thus the various settings can be seen at a glance.

All tubes and connection terminals are conveniently located, the water supply inlet and outlet fittings are on the outside of the enclosure, and a row of indicating lights on the front door show instantly whether (1) the water flow is adequate, (2) power has been applied, and (3) the time-delay has timed out.

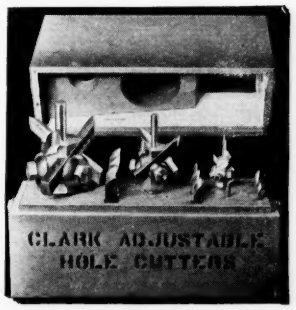
Mention R364 When Writing or Using Reader Service

ADJUSTABLE HOLE CUTTERS

Robert H. Clark Co.,

9330 Santa Monica Blvd., Beverly Hills, Calif.

A new set of three adjustable hole cutters that cut all possible diameters from ⅝ in. to 3½ in. is announced by this company. These cutters—with straight shanks for use as hand tools, in portable electric and pneumatic drills, or in light drill presses — are said to produce accurate, clean holes that require no after-grinding, reaming or filing.



The manufacturer claims many advantages over cutting torches, hole saws, or drills for cutting holes in either thick or thin metals. The cutters are adjustable and can be easily sharpened by any competent mechanic. They may also be used in lathes and other spindle-type machines. They consist of a straight shank on a hexagon body, into which are set three high speed steel blades at 120° intervals. The three hole cutters, with an extra set of blades for each, are packed in a handy wooden box 3½ x 7¼ x 10 in. which is securely fastened to protect shanks, pilots, and blades when jostled around.

In addition to their extreme adjustability these tools are said to cut holes efficiently in varying thicknesses of materials. For example, the largest of the three tools has a capacity ranging from thin sheets to ⅝ in. thick (1¼ in. where work can be reversed). It is claimed that the balance provided by the special three-blade design makes it possible to cut holes in curved or irregular surfaces such as pipe or tubing. Aluminum, duralumin, steel, brass and many "problem" materials—all may be handled successfully with these cutters.

Mention R365 When Writing or Using Reader Service

BERYLLIUM COPPER

Little Falls Alloys, Inc.,
189 Caldwell Ave.,
Paterson, N. J.

Using a new silver coating process, this company is now in production on "spring grade" beryllium copper wire, available in 0.064 to 0.007-in. sizes. This wire, trademarked "Silvercote" has a guaranteed minimum tensile strength of 190,000 psi. after hardening. Deliveries can be made in four to six weeks.

Mention R366 When Writing or Using Reader Service

ETCHER AND DEMAGNETIZER

Ideal Commutator Dresser Co.,
1929 Park Ave., Sycamore, Ill.

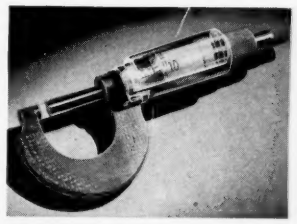
New tool that is ready for instant use as either an etcher or demagnetizer, enclosed in an attractive case with a removable hinged cover, has been developed by this company. To etch, small tools and parts are simply placed on the work-plate and switch is turned to proper heat. A ground clamp is provided for etching parts too large for the work-plate. Fourteen heats are provided, giving a wide range for marking all iron, steel and their alloys from small delicate parts up to large smooth castings. When using ground clamp to etch large parts, the "keeper" must be removed from front of case and placed on work-plate across transformer poles. An indicating lamp glows brighter as each higher heat is used. To demagnetize, it is only necessary to turn the switch on to either No. 1 or No. 2 position and proceed as with ordinary demagnetizer.

Mention R367 When Writing or Using Reader Service

MAGNA-EYE FOR MICROMETERS

Stebar Mechanical & Electrical Research Laboratories
711 W. Lake St., Minneapolis 8, Minn.

The Magna-Eye, made of light weight, transparent methyl-methacrylate, helps tool and die makers and inspectors to read micrometers quickly without eye-strain. It fits closely over the scale, magnifying the numbers and visions, giving them greater visibility without interfering with its use. Because of its light gathering properties, Magna-Eye renders the scale readily visible in poorly lighted places where the micrometer, without it, would be impossible to read. The efficiency of the user is increased. Readings are correct, resulting in less waste of time, less material spoilage and rejections. Magna-Eye protects the micrometer from dust and dirt and many users have discovered that because of its large magnification it is easy to split the divisions of the ordinary micrometer into tenths.

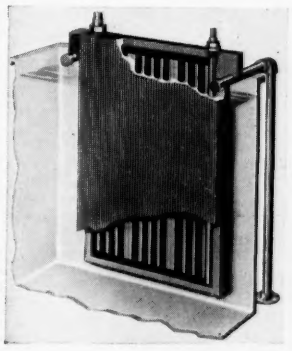


Mention R368 When Writing or Using Reader Service

CORROSION RESISTANT HEAT EXCHANGER

The National Carbon Co., Inc.
W. 117th & Madison Ave., Cleveland, Ohio

A compact, sturdy new type of corrosion resistant "Karbate" heat exchanger to meet the need for a chemically inert, mechanically strong heating or cooling unit for use in pickling tanks and other metallurgical applications has been developed by this company. The "Karbate" material from which the heater is made is an impregnated graphite impervious to liquids under high pressures; it possesses high heat transfer values and is resistant to practically all acids, alkalis and solvents.



The exchangers are of plate type, employing the principle of extended, or corrugated, surface to attain maximum heat transfer area without bulkiness. Installation requirements and economical manufacturing methods caused the company to adopt four standard design groups incorporating both parallel and series flow channels, thus making possible 30 different combinations to meet the widest range of heating and cooling requirements. Small and interchangeable, the units are designed so that they can be readily adapted to various sizes of tanks; they can be mounted in multiple or single units and need little space in the tank.

In certain pickling and plating applications, the heaters, due to their inertness and extremely high heat transfer characteristics, have replaced steam spargers which introduce steam directly into the bath itself for heating purposes. In these processes where spargers have been replaced, the problem of acid dilution from condensing steam has been avoided.

Mention R369 When Writing or Using Reader Service

MANUFACTURERS' CATALOGS IN REVIEW

Rotary File Handbook

The Rotary File Co., Stratford, Conn.

A handsomely illustrated new catalog in standard file size features this company's full line of standard shapes in hand-cut rotary files and a number of special designs. The booklet gives historical sidelights on the development of modern hand-cut rotary files and a description of the unique craftsmanship demanded in their manufacture.

This interesting, well-presented material goes far toward explaining the growing dependence upon the hand-cut rotary file for "clean-up" jobs where accuracy and finish are required, and where production has to move at a fast pace. All varieties of tooth cuts are shown, and a wide range of ingenious file shapes. The book, in effect, provides the production executive or shop foreman with a blueprint for his guidance in selecting the appropriate types of rotary files for either ordinary or extraordinary applications.

Mention R370 When Writing or Using Reader Service

Micromax and Speedomax Rayotube Pyrometers

Leeds & Northrup Co.,
4934 Stenton Ave., Philadelphia, Pa.

To show how war plants have been applying Rayotubes and Micromax equipment to important new temperature-measuring jobs, this company has just revised its Micromax Rayotube pyrometer catalog. Embodying, in this 48-page edition, basically the same engineering descriptions as were presented in the 1941 publication, it includes for the first time equipment being used to measure the temperature of molten cast iron, electric salt pots and blast furnace stove domes.

Mention R371 When Writing or Using Reader Service

The Four Steel Castings That Made History

The Ohio Steel Foundry Co., Springfield, Ohio

Until now, the story of the cast steel breech ring has been pretty much of a "hush-hush" affair. With the need for secrecy past, this company has issued a 12-page booklet on the development and production of these breech rings. The booklet cites several advantages for the cast steel breech ring including the saving of an almost unbelievable number of man-and-machine hours, of materials and costs. It makes a direct comparison of steel casting and forging.

Mention R372 When Writing or Using Reader Service

Quick-Quench Furnace

James H. Knapp Co.,
4920 Loma Vista Ave., Los Angeles, Calif.

Many features of the Knapp-Lee "Quick-Quench" heat treat furnace are illustrated in this attractive big broadside. Designed for the treatment of aluminum alloy parts, the furnace is charged from beneath, with parts racked on a carriage mounted on a pneumatic hoist. In five seconds, the charge may be fully immersed in the bath directly beneath the furnace.

Mention R373 When Writing or Using Reader Service

Steam Jet Agitators

Heil Engineering Co.,
12901 Elmwood Ave., Cleveland 11, Ohio

A complete series of Heil jets for the direct introduction of steam or air into corrosive solutions to heat them to the optimum temperatures is described in this new four-page leaflet. These jets are designed to give agitation to any or all parts of the vats, increasing the mechanical scouring action and the complete chemical effect upon the contents to be treated.

Illustrated are jets for tank processing of bar metals, continuous sheet or strip; for batch type pickling of sheets, coiled strip, coiled rod, tank aeration, mixing and for tube pickling.

Mention R374 When Writing or Using Reader Service

Flow Rate Measurement

Fischer & Porter Co.,
9135 County Line Rd., Hatboro, Pa.

This is a new, highly interesting and instructive catalog on the Rotameter, the area-type flow meter for accurately measuring the flow rate of liquids and gases. This catalog 10B, entitled "A New Era in Flow Rate Measurement," contains 32 pages of the latest authoritative information on this instrument. The catalog shows how the instrument works, its high accuracy, how it can be made immune to variations in viscosity and specific gravity. A list of fluids successfully handled and some typical applications are included.

Mention R375 When Writing or Using Reader Service

Some Basic Facts About Cerium

Cerium Metals Corp., 522 Fifth Ave., New York 18, N. Y.

This leaflet describes Cerium Master Alloys in various composition ranges and forms, citing many applications. For example, cerium alloy additions of less than 0.5% in conjunction with manganese are known to refine the grain, increase hot strength, hardness and corrosion resistance. Their use with stainless steels, bearing metals, refractory metals, tool steels and welding electrodes are also discussed. The company has developed the production of Cerium alloys into a controlled routine manufacturing process assuring adequate supplies.

Mention R376 When Writing or Using Reader Service

Preparation of Ferrous Surfaces

Oakite Products, Inc., 22 Thames St., New York 6, N. Y.

A new "Special Service Report" describes a development in the preparation of ferrous surfaces prior to painting or the application of other organic finishes. Known as Oakite Compound No. 86, this new material is said to perform three functions in one operation: (1) Its effective detergent action removes light spinning compounds, drawing lubricants, machining oils, finger marks, shop dirt, etc. (2) It conditions the surface for organic finishing by imparting a microscopic crystalline protective coating on work, thus assuring firm grippage of paint or similar finish. (3) This coating also acts as a rust inhibitor protecting parts against rusting between operations. Primarily designed for use in pressure washing machines, this compound can also be used effectively by tank immersion method.

Previously restricted exclusively to war industries, it has now been made available to all metal working and finishing plants.

Mention R377 When Writing or Using Reader Service

X-Ray Cameras and Accessories

Otto von der Heyde,
78 Winchester St., Newton Highlands 61, Mass.

Several types of X-ray cameras and accessories, built with a view to high precision performance and adaptability, are illustrated in this 8-page leaflet. Included are a batter of powder cameras, Weissenberg camera, heating camera, adjustable camera base with motor and film measuring instrument.

Mention R378 When Writing or Using Reader Service

Welding and Cutting Safety Standards

American Standards Association.
29 W. 39th St., New York 18, N. Y.

Further evidence of the welding and cutting industry's alertness and leadership in the safety field is shown by the publication of an attractive 32-page booklet entitled "Safety in Electric and Gas Welding and Cutting Operations".

This is another in the series of American War Standards developed by the American Standards Association. Its preparation was initiated by the International Acetylene Association, the American Welding Society, the National Electrical Manufacturers Association, and the Division of Labor Standards of the U.S. Department of Labor. The booklet is designed to serve as a guide for the protection of the individual operator from injury or illness, and for the protection of property from fire or other damage arising out of improper methods in the installation, operation, or maintenance of welding and cutting equipment. It covers every phase of safety applicable to all ordinary welding, cutting, brazing, lead burning, and flame treating operations. It does not attempt to cover any special hazards which may be inherent in the operations of special industries such as explosives manufacturing or shell-loading.

Single copy price is 40c, with special prices for quantity orders.

Mention R379 When Writing or Using Reader Service

Pneumatic Tool Catalog

Aro Equipment Corp., Bryan, Ohio

A new 32-page catalog describes the line of rotary pneumatic tools manufactured by this company. It contains illustrations and specifications covering the wide range of models available for small tool jobs such as drilling, grinding, nut setting, screw driving, burring, metal sanding and other operations. Distinguished by compactness and light weight in relation to power, these tools enable the user to get work done in many tight spots otherwise inaccessible.

Mention R380 When Writing or Using Reader Service

Robot Oil Reclaimer

The Youngstown Miller Co., Sandusky, Ohio

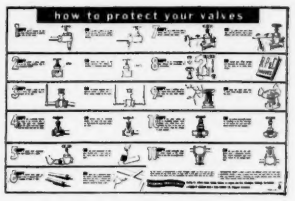
New bulletin YM-700 covering the new Robot Oil Reclaimer points out that this equipment employs the process that this company has used in batch oil reclaimers for over ten years—with the new feature that operation is now automatic and continuous. These units are capable of restoring all kinds of lubricating, hydraulic, cutting and vacuum pump oils so that the reclaimed oil can be re-used in the same manner and place as the new oil. Capacities range from 4 to 300 gal. per hr.

Mention R381 When Writing or Using Reader Service

Valve Do's and Don'ts

Reading-Pratt & Cady Div.,
American Chain & Cable Co., Inc., Bridgeport, Conn.

Eleven tips on the handling and care of valves are graphically illustrated in this new 11 x 17-in. chart. The protection angle is stressed by pointing out the common mishandlings that often reduce valve life. Simple, factual copy is illustrated by graphic sketches portraying the right and wrong way to handle each situation. Chart is printed on heavy stock for posting and is excellent for new workers and as a refresher for old hands.



Mention R382 When Writing or Using Reader Service

Beryllium Copper

Instrument Specialties Co., Inc., Little Falls, N. J.

A discussion of the discovery and history of beryllium copper and its importance in spring design is presented in this eight-page booklet, which contains a bibliography of beryllium copper up to Jan. 1, 1944.

Mention R383 When Writing or Using Reader Service

Copper Welding

Eutectic Welding Alloys Co.,
40 Worth St., New York 13, N. Y.

Copper welding is the subject of the lead article in the June issue of The Eutectic Welder, an interesting monthly paper devoted to the welding industry. The article discusses the kind of copper on which the welding is to be done, new copper welding rods and very low temperature welding.

Another feature of the publication is the section "How It Was Done," devoted to solutions of actual shop problems.

Mention R384 When Writing or Using Reader Service

Temperature Control for Degreasers and Cleaners

Sarco Co., Inc., 475 Fifth Ave., New York 17, N. Y.

A new four-page bulletin, No. 650, describes special temperature controls for degreasing and other metal cleaning machines. Simple self-operated controls for both heating and cooling are said to maintain vapor lines on degreasers within narrow limits. At the same time they are claimed to effect substantial savings in solvent and water. Complete description and engineering data.

Mention R385 When Writing or Using Reader Service

Anodes and Plating Chemicals

Hanson-Van Winkle-Munning Co., Matawan, N. J.

A new booklet on anodes and plating chemicals, AC-105, includes data on anodes of nickel, brass, copper, zinc, cadmium, tin, lead, silver and anodes for chromium plating. The plating chemicals described include salts and chemicals for plating nickel, black nickel, zinc, cadmium, tin, lead and silver; also sodium cyanide.

Mention R386 When Writing or Using Reader Service

Metal Cutting Band Saws

Crescent Machine Co., Leetonia, Ohio

The unlimited possibilities of high speed band sawing of aluminum, brass and extruded metal castings, sheet metals, tubes, etc., are described in this new leaflet. Sizes of these band saws range through 20 in., 32 in. and 36 in. Complete specifications, including speed chart, presented.

Mention R387 When Writing or Using Reader Service

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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